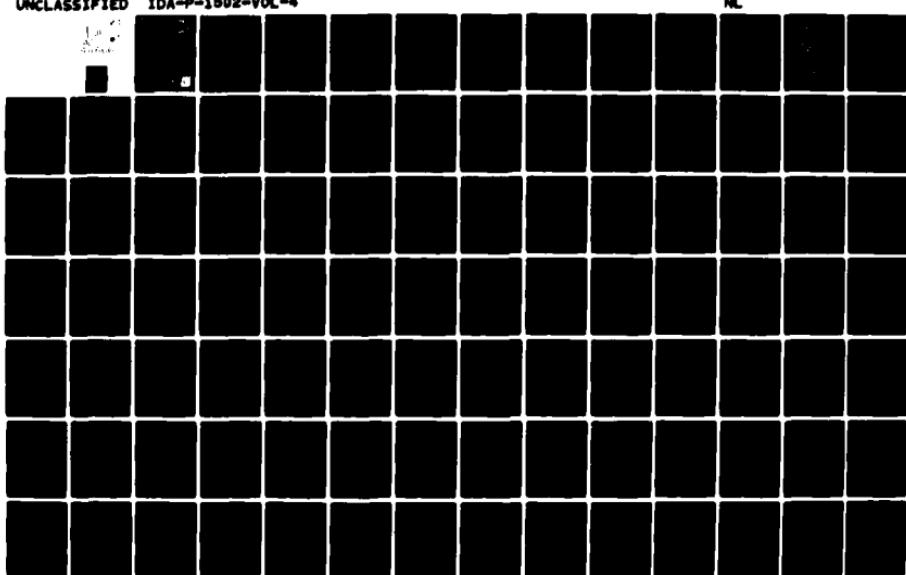
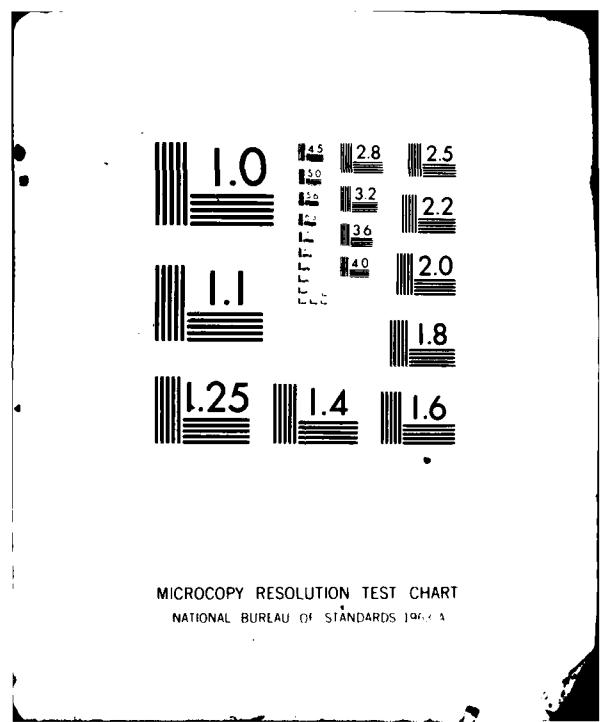


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INFORMATION EXCHANGE REQUIREMENTS FOR FIELD ARTILLERY ADP SYSTEMS

Volume IV: ANNEX C

Organization and Employment of
US Army Field Artillery

L. Scheiber, Project Leader
R. Enlow

November 1981

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Prepared for
Deputy Under Secretary of Defense
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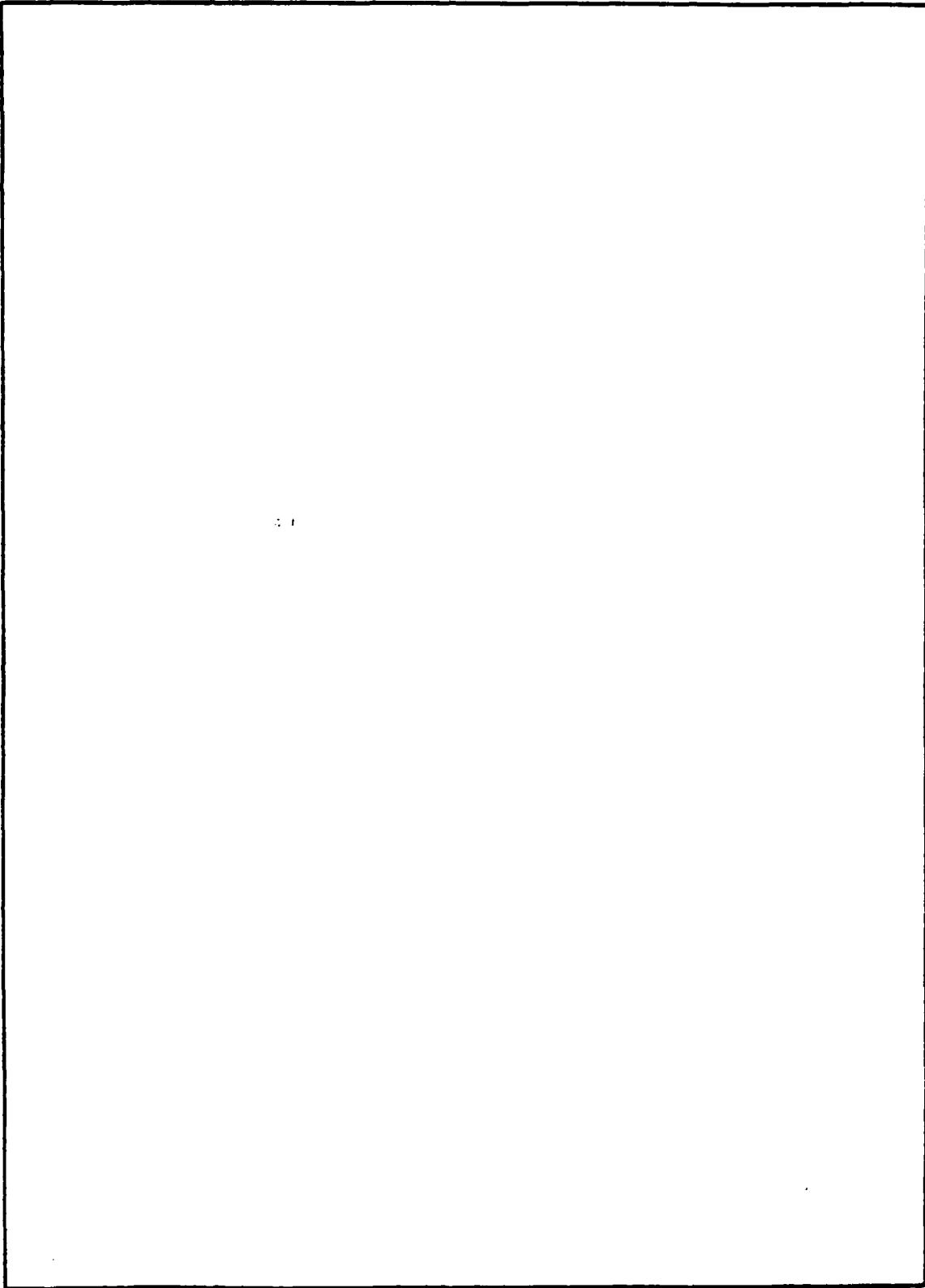
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PURPOSE

The Land Interface Sub-Working Group (LISWG) of the Central Region Interface Working Group (CRIWG) has been given the responsibility of defining the operational Information Exchange Requirements (IERS) to be used to interface the ground ADP systems of one Central Region nation with those of another and with the NATO systems. The LISWG has asked IDA to provide, for validation by the LISWG, the IERS required to connect, at specified points, the artillery ADP systems being developed by the different nations.

The purpose of this briefing book is to describe the United States Field Artillery System in such a way and with sufficient detail to provide the information needed in the development of the IERS for the artillery-to-artillery interfaces. The information in this book is intended to be directly comparable with similar descriptions of the artillery systems of the other nations on a page by page basis.

Where echelon equivalence does not exist, functional equivalence is approximated for the various countries and the correspondence between briefing books is maintained.

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SUMMARY

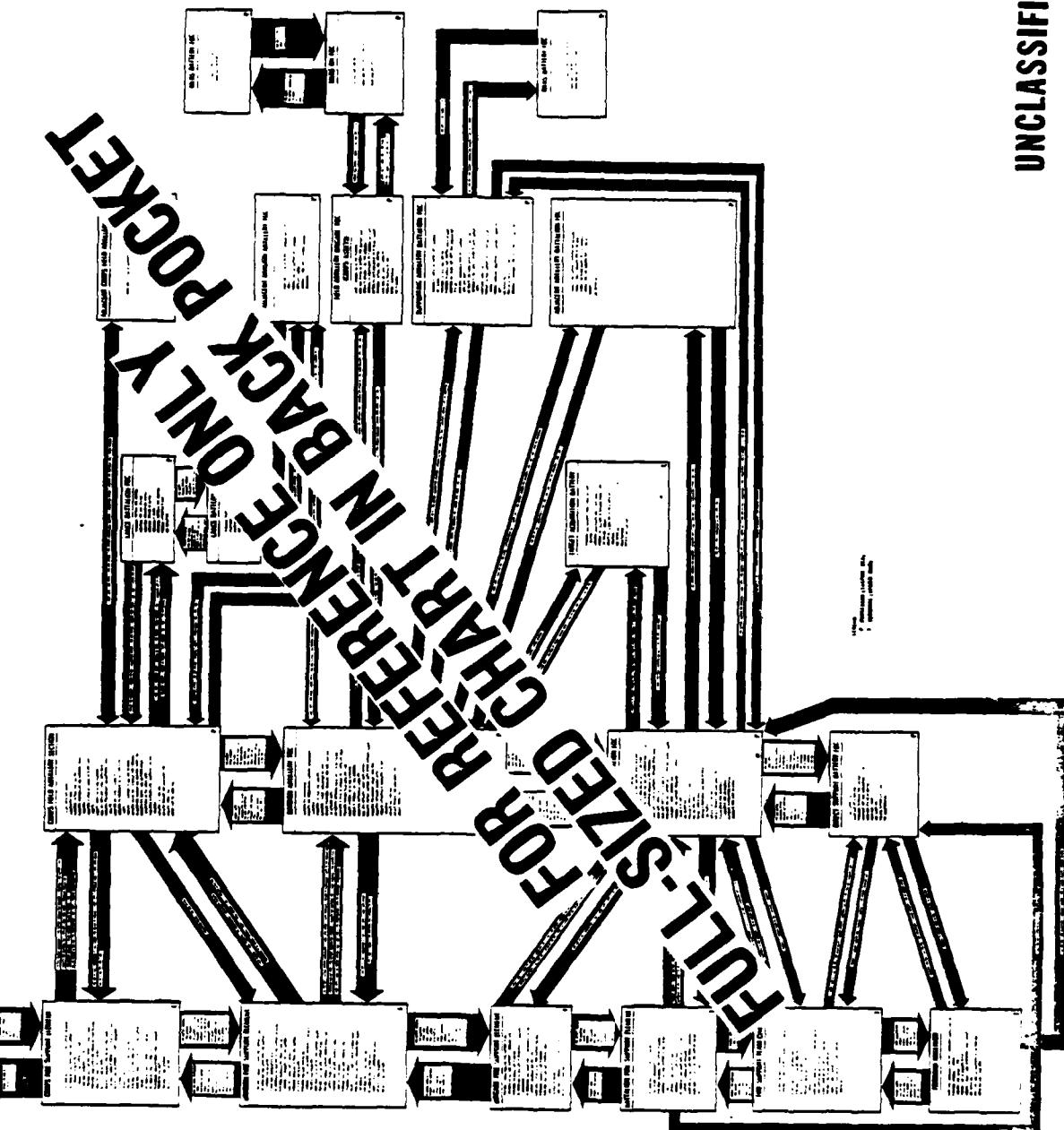
The following figure¹ summarizes the functions performed in the various US Army field artillery organizations and the information that flows between these organizations. The figure is organized with the artillery elements that interface with the maneuver units on the left, the major artillery headquarters in the center, and the supporting units to the right. The arrows show the direction of the information flow, and they contain the information categories transmitted. Each organizational box delineates the specific functions performed and indicates whether a processor (P) or terminal (T) is planned for the automatic data processing (ADP) assisted system. A limited number of information categories relating to nuclear operations are included on the figure.

¹The figure on page 3 is for reference only. A full-sized copy has been inserted in the pocket in the rear of this book.

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SUMMARY OF FUNCTIONS AND INFORMATION FLOW FOR US ARTILLERY



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SECTION 1

INTRODUCTION

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UNCLASSIFIED**INTRODUCTION**

This briefing book comprises eight major sections, of which this Introduction is the first. The second section, Organizational Structure, describes the structure and the overall function of the artillery organizations from the corps down to the fire support teams and shows how the artillery units interface with the maneuver units. The third section, Tactical Tasks and Responsibilities, describes the tactical missions of the field artillery and the responsibilities of intrinsic relationships. The section Concept of Operations describes the planning, coordination, and execution functions of artillery, and the fifth section indicates which of these functions are performed in each of the artillery organizations. Section VI, Information Exchanged Between Artillery Organizations, discusses the information exchanged between each of the artillery headquarters and units. The seventh section, ADP Support--TACFIRE and Battery Computer System (BCS), describes the ADP support being developed for each of the headquarters and units, including the type of equipment, how this equipment is to be interconnected, and the fire planning and fire mission support provided by the ADP equipment. The last section, Nuclear Operations, describes the flow of messages related to nuclear release, planning, missile strikes, and artillery strikes within a corps. Release, authentication, and weapon activation messages, which originate above corps, are mentioned but are not discussed in detail in this book.

This briefing book also contains a Summary and several Appendices. A summary chart showing the basic functions performed by and information flow between the major artillery organizations from corps to forward observer is inserted in a pocket at the rear of this book.

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SECTION II

ORGANIZATIONAL STRUCTURE

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This figure is a schematic representation of the organizational structure of a typical US Army corps in garrison. The corps is a flexible unit of two to six divisions whose composition is dictated by mission. It is the highest tactical and administrative echelon in the US Army and operates under a joint or combined headquarters. The corps artillery consists of a field artillery section (FAS) with the corps general staff and a variable number of artillery brigade headquarters equipped with ground missiles and cannon artillery battalion. Usually the number of separate artillery brigades in a corps is approximately equal to the number of divisions. The corps also has other combat and combat-support units, such as an armored cavalry regiment and engineer, aviation, and signal units. The number and size of these units depends on the size of the corps and its mission.

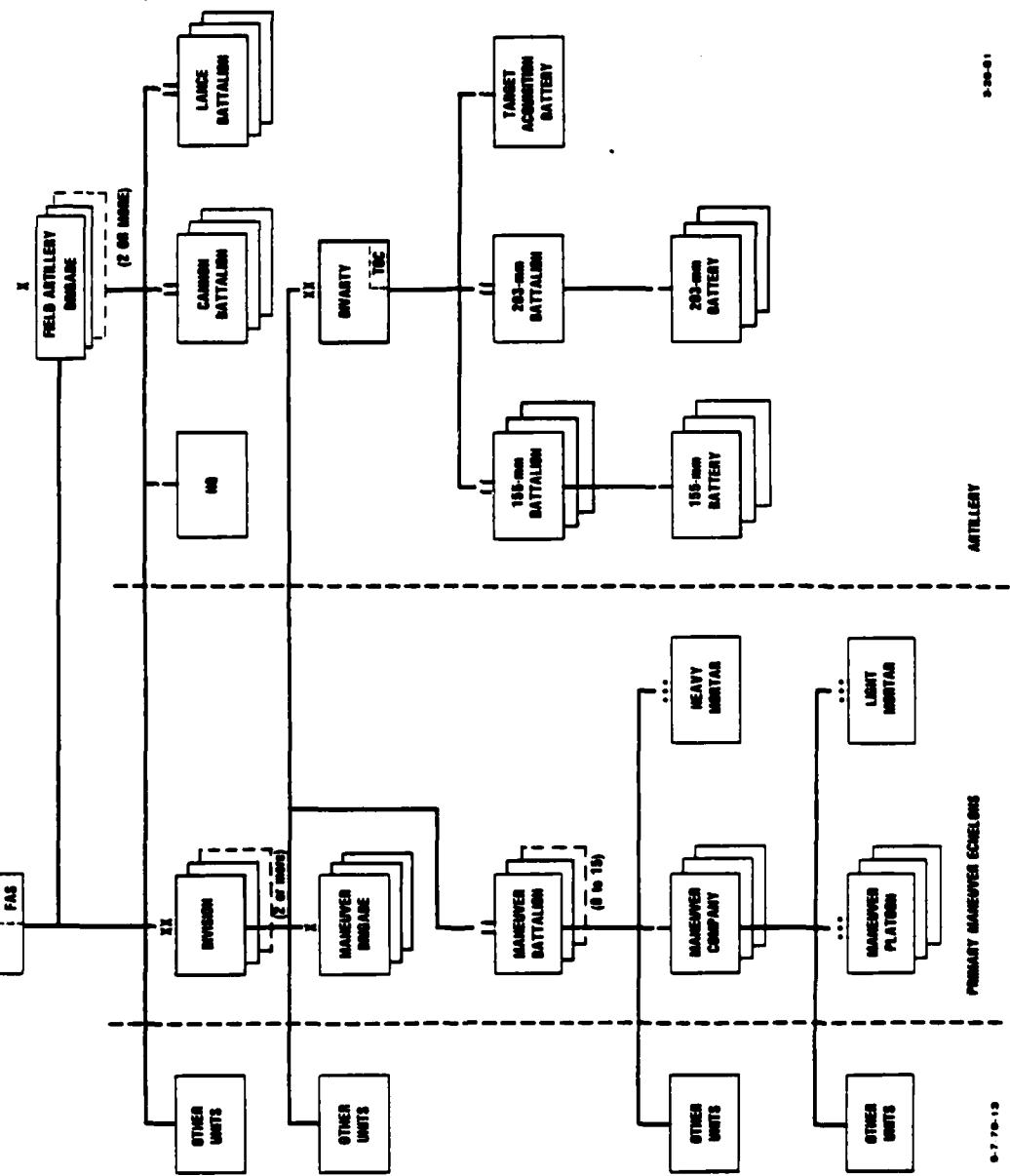
The division is the central element of the corps and is designed for relatively independent operations. The United States has five kinds of divisions—armored, mechanized, infantry, airborne, and air mobile. Armored and mechanized divisions, which differ primarily in the ratio of tanks to mechanized infantry, are the backbone of US forces in Europe. The other three divisions generally have lighter equipment with differing capabilities for strategic and tactical mobility. However, all divisions have a common concept of organization: each comprises a division headquarters, three brigade headquarters, a division support command (DISCOM), the division artillery (DIVARTY), and as many as 15 battalions of maneuver forces. In addition, the division base includes an armored or air cavalry squadron, an aviation battalion, an air defense artillery battalion, an engineer battalion, a signal battalion, a combat electronic warfare and intelligence (CEWI) battalion, an NBC defense company, and a military police company. The number of maneuver battalions in a division is determined by force structure, mission, and number of available resources—in peacetime, 8 to 12 are usually assigned.

Brigade headquarters are tactical headquarters with operational control of an assortment of maneuver battalions and other forces, depending on the tactical situation. Battalions have fixed organizations and equipment complements. They are structured to be administratively and logically self-sufficient and to communicate directly with the DISCOM rather than the brigade headquarters for these administrative functions. The tank and mechanized infantry battalions shown here have three line companies, a headquarters, and a combat support company. The line companies have three platoons each. Mortars at the mechanized infantry battalion level are heavy (107 mm); those at the company level are light (81 mm).

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TYPICAL US CORPS IN GARRISON



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This figure shows a typical US Army corps organized for combat. The corps normally augments the divisions. Additional maneuver forces (armored cavalry regiments, separate brigades, or brigades from other divisions) may be attached temporarily to divisions to meet specific needs. Combat support units, such as artillery, are either attached to or placed in support of the various divisions. In this figure, corps artillery brigades have been attached to the divisions and are subordinate to the DIVARTY. Usually LANCE missiles and some cannon artillery are retained under corps control.

The DIVARTY is responsible for all division artillery operations. It provides fire support elements (FSEs) (shown by dotted lines in the figure) at both the main and tactical command posts of the division headquarters. These elements, and those at lower echelons, assist the maneuver commanders in planning and coordinating fire support from all available resources, not just from field artillery—a key feature of the US system. Within the division, the number of maneuver battalions and other combat and combat support forces is dictated by the tactical situation. In addition, FSEs are established at each maneuver echelon. The FSEs for the brigade, battalion, and company echelons are drawn from field artillery battalions as shown in the figure. The company level FSE is known as a fire support team (FIST).

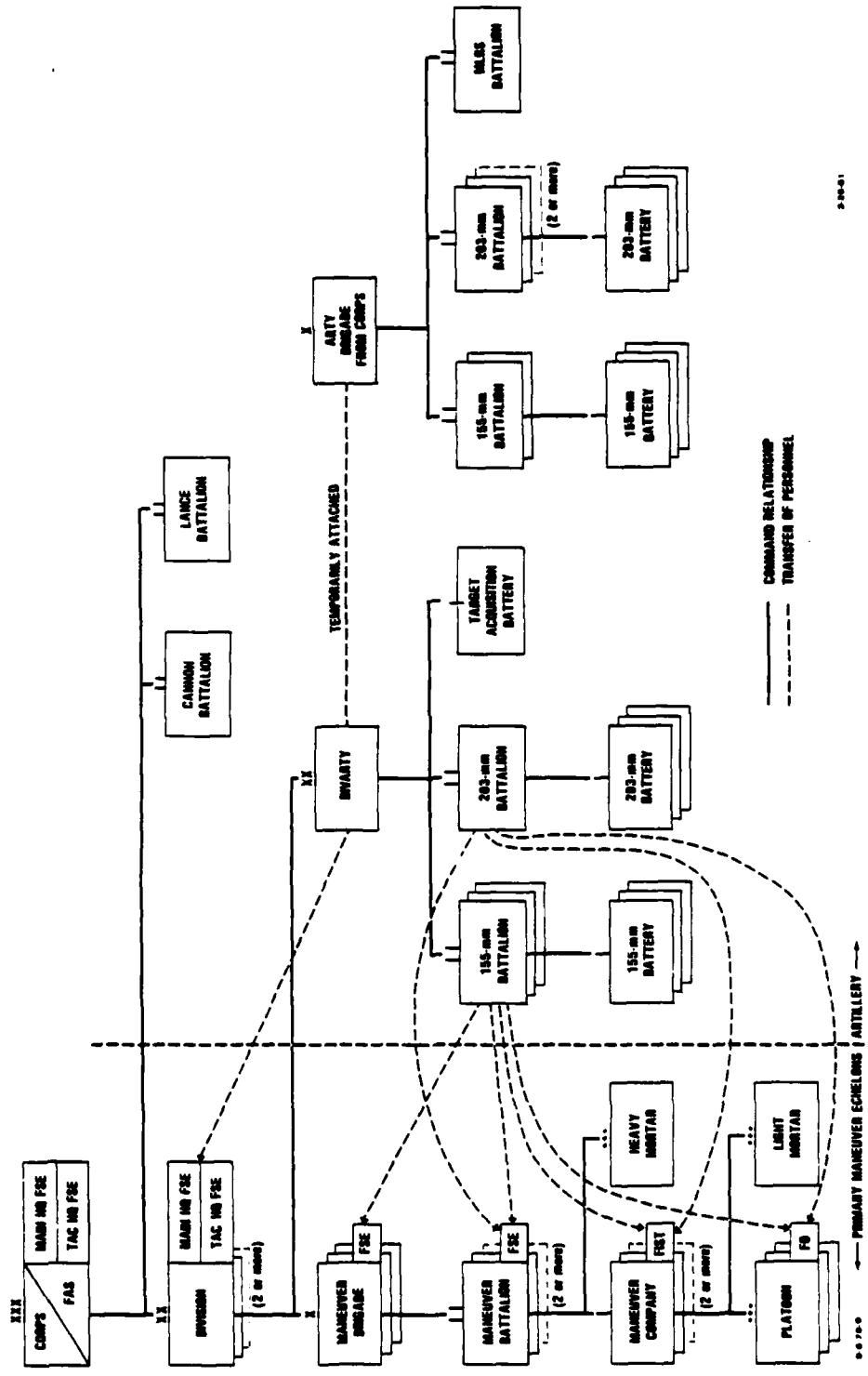
The 203-mm battalion in DIVARTY and the battalions in the artillery brigade from corps primarily respond to fire mission requests from the force artillery headquarters.

The artillery organizations supporting each echelon from corps to company level are discussed in more detail in this section.

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TYPICAL US CORPS ORGANIZED FOR COMBAT



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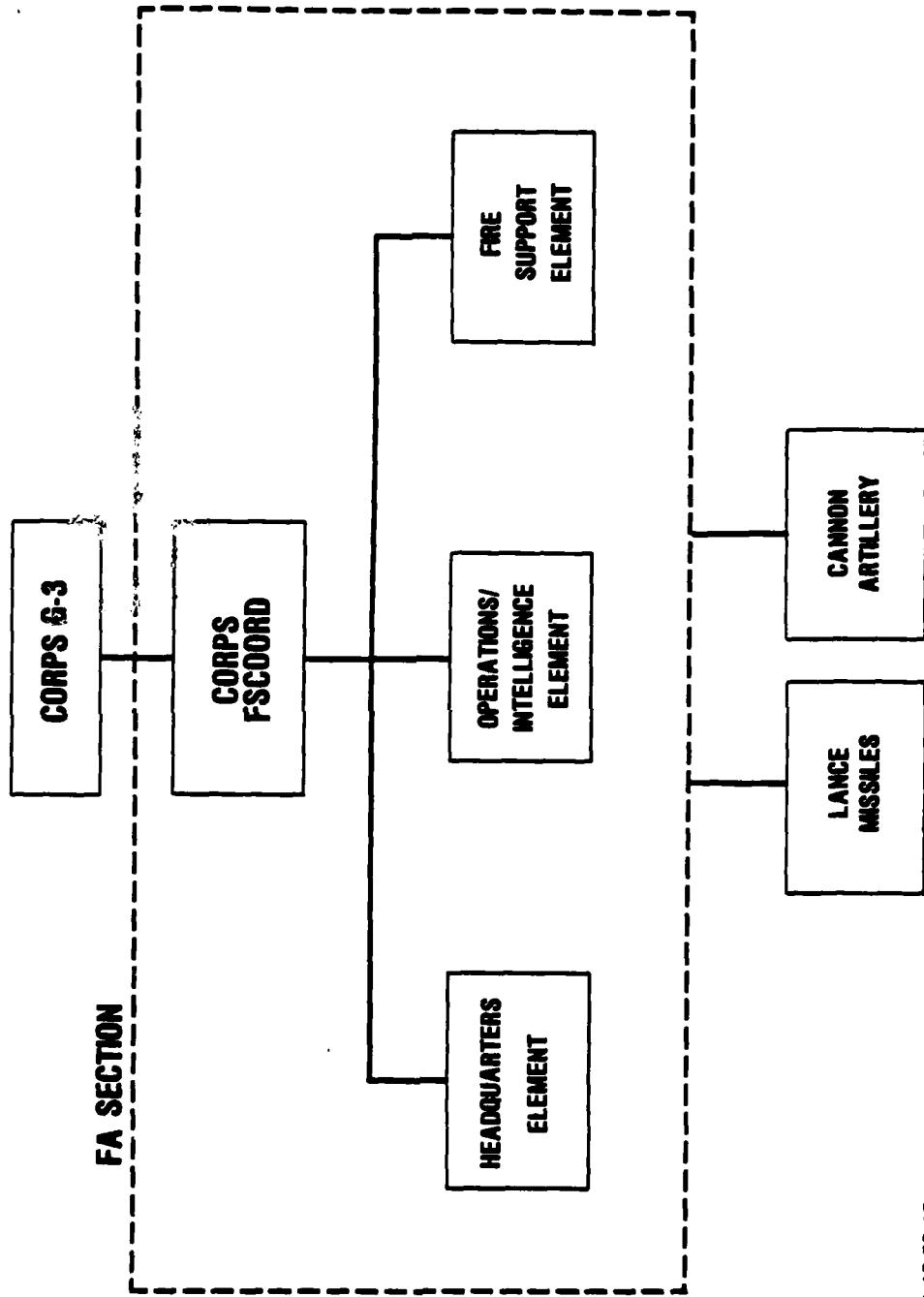
The corps field artillery section (FAS) is organic to the corps headquarters and functions under the supervision of the Fire Support Coordinator in support of the Assistant Chief of Staff, G-3. It plans and coordinates the total fire support effort for the corps and provides tactical control of field artillery units retained under corps control. A general officer, who is the commander of corps artillery and serves as fire support coordinator (FSCOORD) to the corps commander, heads the field artillery section.

As shown in the figure, the FAS comprises three elements: the headquarters element, the operations/intelligence (O/I) element, and the fire support element (FSE). The headquarters element provides the personal staff for the corps artillery commander and is normally collocated with the O/I element inside the corps main command post perimeter. The O/I element plans, coordinates, and executes field artillery support for the corps. The FSEs at the corps main and tactical command posts plan and coordinate the total fire support effort. The main FSE is located within the corps tactical operations center (CTOC). (The detailed functions of the corps O/I element and FSE will be given in Section V.)

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FIELD ARTILLERY SUPPORT AT CORPS LEVEL



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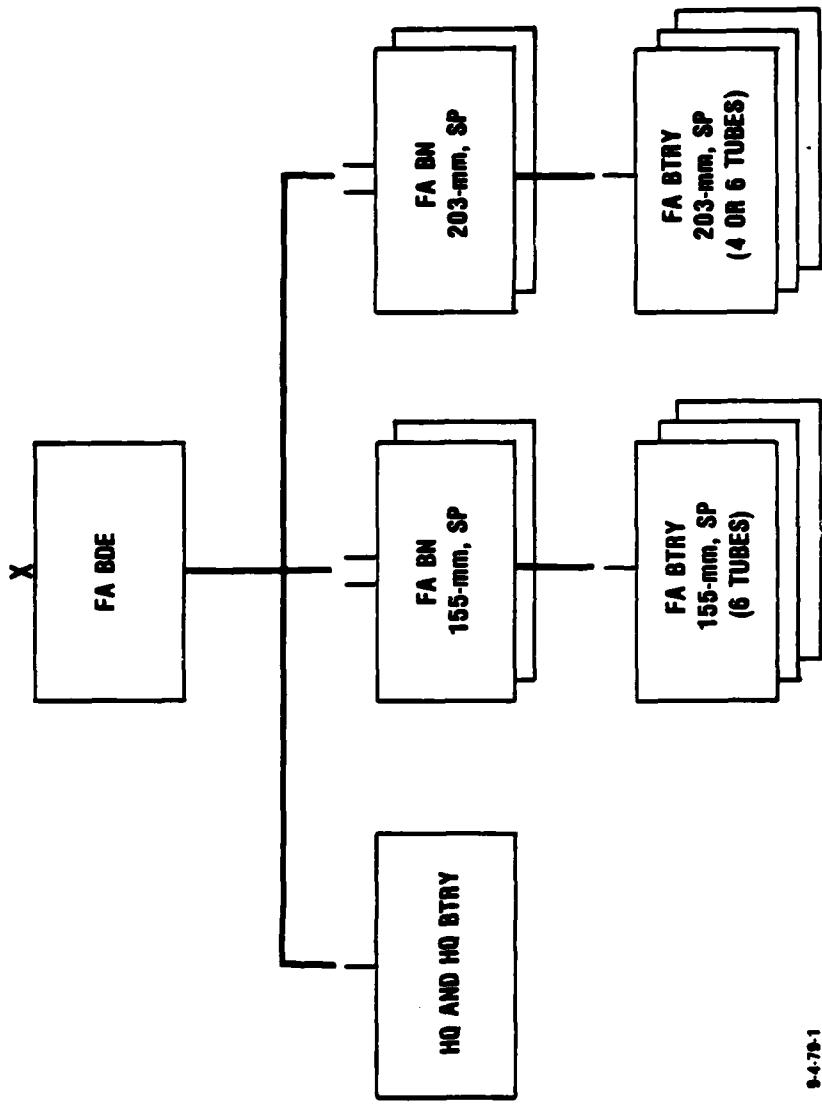
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In addition to the FAS, assigned corps artillery may include several brigade headquarters and a number of cannon artillery and LANCE battalions. Using these assets at the direction of the corps commander, the corps forms field artillery brigades that may include cannon artillery only, missiles only, or a combination of the two. Cannon artillery brigades may be attached to the divisions in combat or retained under corps control; details of the allocation depend on the tactical situation. Normally, LANCE missile battalions will be retained under the control of the corps artillery element.

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TYPICAL FIELD ARTILLERY BRIGADE



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This figure shows the organization of the division artillery of an armored or mechanized division. The DIVARTY consists of six separate units: a headquarters with a headquarters battery, three battalions of 155-mm self-propelled (SP) howitzers, one battalion of 203-mm SP howitzers, and a target acquisition battery. Each battalion of 155-mm howitzers has three subordinate batteries of six or eight tubes each. The battalion of 203-mm guns has three batteries of four tubes each. In addition, the battalions have personnel and equipment to provide field artillery support directly to the maneuver units of the division. This support includes FSEs at the brigade headquarters and at each maneuver battalion headquarters and a FIST at each maneuver company (see page 11).

The target acquisition battery (TAB) contains a moving-target-locating radar, sound and flash ranging equipment, and several countermortar and counterbattery radars. The TAB radars may be attached to the various artillery battalions; however, their locations and zones of coverage are controlled by the DIVARTY headquarters to ensure the best coverage across the division front.

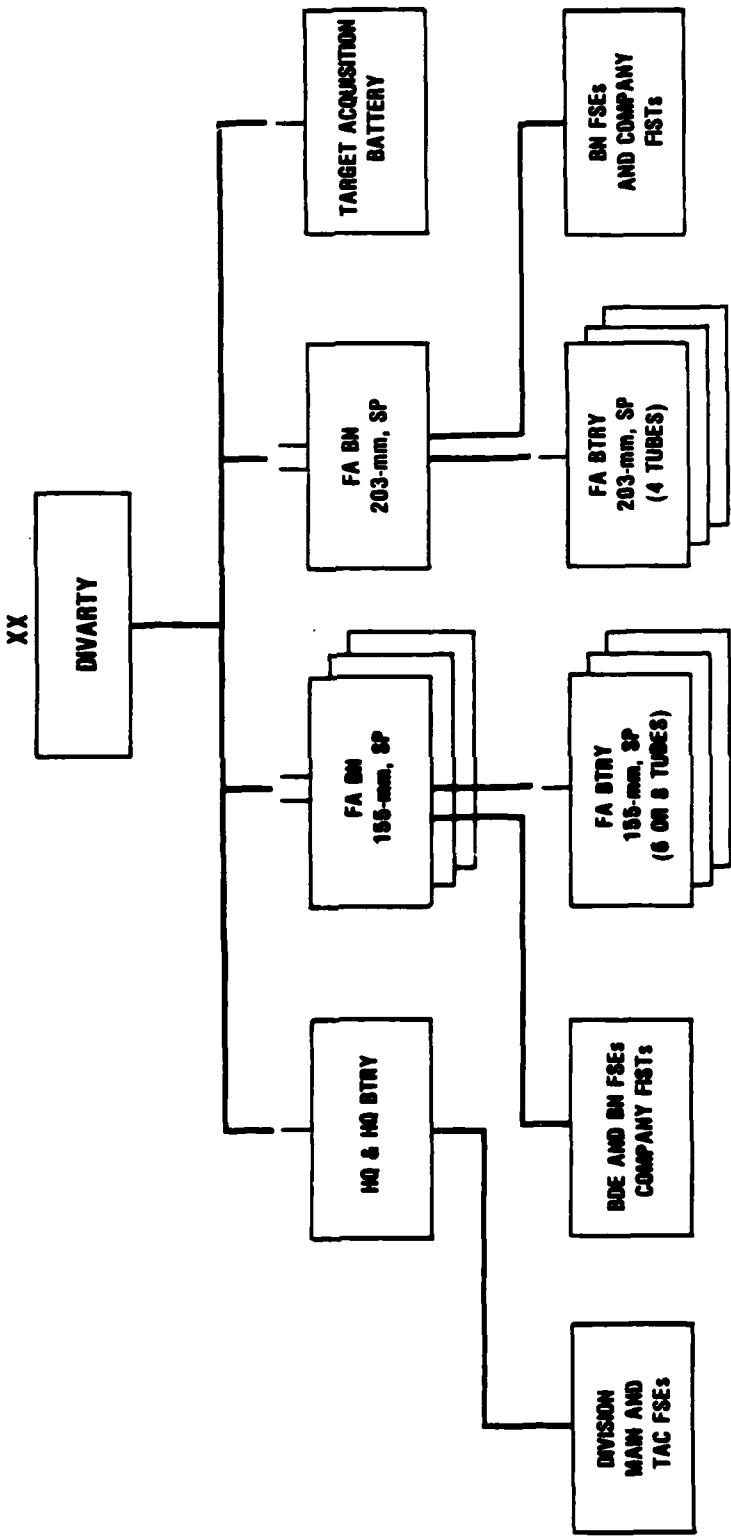
At each lower echelon, as at the corps level, the senior field artillery officer, known as the FSCOORD, is the commanding officer's principal advisor on fire support matters. For the division, the FSCOORD is the DIVARTY commander. He is usually a colonel and may be located at the DIVARTY or with the division commander, as the situation requires.

The division has five assistant FSCOORDS (AFSCOORDs). The senior AFSCOORD, a lieutenant colonel, follows the commanding general as he alternates between the main and tactical command posts. Of the remaining AFSCOORDs, two are stationed at the main FSE and two at the tactical FSE. The senior permanent representative in each FSE is called the fire support officer (FSO).

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**ORGANIC ARTILLERY SUPPORT AT DIVISION
LEVEL
(ARMORED AND MECHANIZED DIVISIONS)**



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This chart summarizes information concerning artillery support at corps level and below. The artillery units provide FSEs to the maneuver units at corps, division, brigade, and battalion and provide FISTS to the companies of the supported brigade.

The brigade level will be discussed as an example of the organization of artillery support. The brigade FSCOORD is the commander of the direct support (DS) artillery battalion. He is represented full time at the brigade FSE by an FSO. In addition, another FSO heads the maneuver battalion FSE and acts as FSCOORD at that echelon. Both FSOs recommend the allocation of fire support, prepare fire support plans, assign target numbers, eliminate duplicate targets, and recommend the establishment of coordination measures. In addition, they monitor and coordinate requests. As the liaisons between maneuver and artillery forces, the FSOs report changes in the status of fire units to the maneuver commander and report changes in requirements for fire support to the DS artillery battalion commander. The battalion and brigade FSEs combine the representatives of all available fire support systems at their respective locations. These include representatives from the Air Force and, when naval gunfire support is available, from the Navy.

Since the functions of the FIST are different, further detail will be provided. The FIST has five primary duties—to request and adjust fire support, to plan fires, to coordinate fire support, to report battlefield information, and to provide emergency control of close air support when necessary. The FIST chief plans and coordinates all fire support for the unit to which he is attached. This includes field artillery, close air support, naval gunfire, mortars, and any other resources employed as fire support. The FIST chief also develops fire support plans, assigns target numbers, and advises the commander on all fire support matters. He acts as a liaison for the supporting artillery unit, keeping it informed of changes in target priorities and reporting battlefield information. The FIST chief reports to the FS0 at the headquarters of the supported battalion. When the FIST supports a tank company, the group has only one observer and supporting personnel. When the FIST supports a mechanized infantry company, the FIST provides a team chief at the company headquarters and three forward observer (FO) teams, one for each maneuver platoon. Since the FSE and FIST are responsible for processing all types of fire requests, the fire support personnel from brigade through company are usually attached to support the same maneuver unit. This is clearly important if the degree of teamwork needed on the battlefield is to be maintained.

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ARTILLERY SUPPORT AT CORPS AND BELOW

Maneuver Echelon	Type of Organization	Description of Support	Number of Personnel	Rank of Senior Member/Title	Parent Artillery Unit
Corps	FSE	Plans and coordinates all fire support for corps (G-3).	50	Colonel/AFSCORD	Corps FAS
Division	FSE	Plans and coordinates all fire support for division (G-3).	26	Lt. Colonel/AFSCORD	DIVARTY
Brigade	FSE	Plans and coordinates all fire support at brigade level (S-3). Supervises subordinate FSEs.	4	Major/AFSCORD	Division's Artillery Battalions (Supporting the Brigade) ^a
Battalion	FSE	Plans and coordinates all fire support at battalion level (S-3). Supervises FIST.	4	Captain/FSCORD	Division's Artillery Battalions (Supporting the Brigade) ^a
Company (armored)	FIST	Coordinates fire support at company level (company commander). Acts as FO. Manages subordinate FO teams.	Armored-4 Mechanized-10	Lieutenant/FSCORD	Division's Artillery Battalions (Supporting the Brigade) ^a

^a See chart page 11.

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SECTION III

TACTICAL TASKS AND RESPONSIBILITIES

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The artillery is organized for combat by assigning tactical missions to various artillery battalions. The US artillery has defined four standard tactical missions: direct support (DS), general support (GS), general support reinforcing (GSR), and reinforcing (R). The Army recognizes seven inherent responsibilities and relationships in these missions; they are summarized in the table.

Direct support battalion fire is most responsive to the immediate needs of the maneuver forces that are being supported and is less responsive to calls for fire from artillery headquarters. On the other hand, control of a battalion's fire is least centralized when it is in a direct support role.

General support missions are used to mass fire, to provide counterfire, and to fire on targets located by use of long range sensors. Units assigned these missions respond first to calls for fire from the artillery force headquarters. Thus, these missions tend to be the most centralized and the least responsive to the immediate needs of the lower echelons of the maneuver forces.

An artillery battalion that has been assigned a reinforcing mission has its fire controlled by the reinforced unit. The reinforcing mission may be assigned to any fire unit; however, the designated fire unit may reinforce only one other unit. The important distinction to draw between direct support and reinforcing missions is that, in a direct support mission, artillery supports maneuver forces; in a reinforcing mission, artillery augments the fire of other artillery.

If a commander finds it necessary to assign a nonstandard mission to a unit, he does so by specifying how each of the seven inherent responsibilities in the first column of the table are to be handled.

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TACTICAL MISSIONS OF FIELD ARTILLERY^a

Artillery With A Tactical Mission of	Answers Calls For Fire In Priority From	Establishes Liaison With	Establishes Communications With	Furnishes Forward Observers to b	Has Weapons Moved And Deployed By	Has As Its Zone of Fire	Has Its Fire Planned By
Direct Support (DS)	Directly supported formation/unit (battalion, regiment and brigade)	The directly supported maneuver formation/unit	Each maneuver company of the directly supported formation/unit	Direct support artillery unit commander or as ordered by force field artillery headquarters ^c	Zone of action of the directly supported formation/unit	Develops own fire plans in coordination with directly supported formation/unit	
General Support (GS)	1. Force field artillery headquarters ^c target acquisition 2. Own observers	No inherent requirement	No inherent requirement	Force field artillery headquarters ^c	Zone of action of the supported formation/unit or zone prescribed	Force field artillery headquarters	
General Support Reinforcing (GSR)	1. Force field artillery headquarters ^c 2. Reinforced artillery unit 3. Own Observers	Reinforced artillery unit	Reinforced artillery unit if approved by force field artillery headquarters ^{c,d}	Reinforced artillery unit if approved by force field artillery headquarters ^c	Zone of action of the supported formation/unit to include zone of fire of the reinforced artillery unit	Force field artillery headquarters or as otherwise specified	
Reinforcing (R)	1. Reinforced artillery unit 2. Own observers 3. force field artillery	Reinforced artillery unit	Reinforced field artillery headquarters	Reinforced artillery unit or as ordered by force field artillery headquarters ^c	Zone of fire of reinforced artillery unit or zone prescribed	Reinforced artillery	

^aIn conformance to STANAG 2886, pp. A-2, A-3, 28 September 1978.

^bThe US does not furnish forward observers, but does furnish fire support teams (FST).

^cForce artillery headquarters or higher artillery headquarters.

^dApplies also to the provision of liaison officers.

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SECTION IV

CONCEPT OF OPERATIONS

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This section provides an overview of the functions carried out in artillery operations. The functions are divided into three categories—fire planning, coordination, and execution. Fire planning describes formal and informal efforts to set up artillery fires. Coordination introduces the fire support coordination measures and organizational interfaces that ensure responsive but harmonized artillery fires. Execution describes the major processes that lead directly to the firing of the weapons.

Other supporting functions, such as allocation of resources, data distribution, and monitoring of status, which are not included in this section, are discussed in Section V, Operational Functions Performed in Each Artillery Organization.

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OPERATIONAL FUNCTIONS

- FIRE PLANNING
 - FORMAL
 - INFORMAL
- COORDINATION
 - PRINCIPLES
 - FIRE SUPPORT COORDINATION MEASURES
- EXECUTION
 - CALL FOR FIRE
 - FIRE ON PLANNED (SCHEDULED) TARGETS
 - FIRE ON TARGETS OF OPPORTUNITY

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Fire planning, undertaken to generate the maximum combat power with the available resources, is performed at all echelons. Fire plans specify targets and weapons, munitions, and volumes of fire to be used against those targets. They may also establish a formal schedule (time) of fires.

As a practical matter, the US Army divides fire planning into two categories--formal and informal. Formal planning is a deliberate process that is performed before a battle by brigades and higher echelons. These plans are usually in the form of written operations orders (OPORDS) that normally flow from higher to lower echelons. Informal planning, on the other hand, is dynamic and is primarily performed just before or during the battle. Most informal planning occurs at the battalion and company echelons, but it can be done at all echelons. The results of informal planning are usually communicated verbally.

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FIRE PLANNING

PURPOSE: TO GAIN MAXIMUM COMBAT POWER BY INTEGRATING FIRE SUPPORT AND MANEUVER EFFORTS	
FORMAL	<ul style="list-style-type: none">● PREPARED BY BRIGADES AND HIGHER ECHELONS● DELIBERATE● PREPARED IN ADVANCE OF BATTLE● FLOWS FROM HIGHER TO LOWER ECHELONS● USUALLY WRITTEN INTO THE MANEUVER OPERATIONS ORDER
INFORMAL	<ul style="list-style-type: none">● NORMALLY DONE AT BATTALIONS AND LOWER ECHELONS● DYNAMIC● DEVELOPED JUST BEFORE OR DURING THE BATTLE● REQUEST FLOW FROM LOWER TO HIGHER ECHELONS● USUALLY COMMUNICATED VERBALLY

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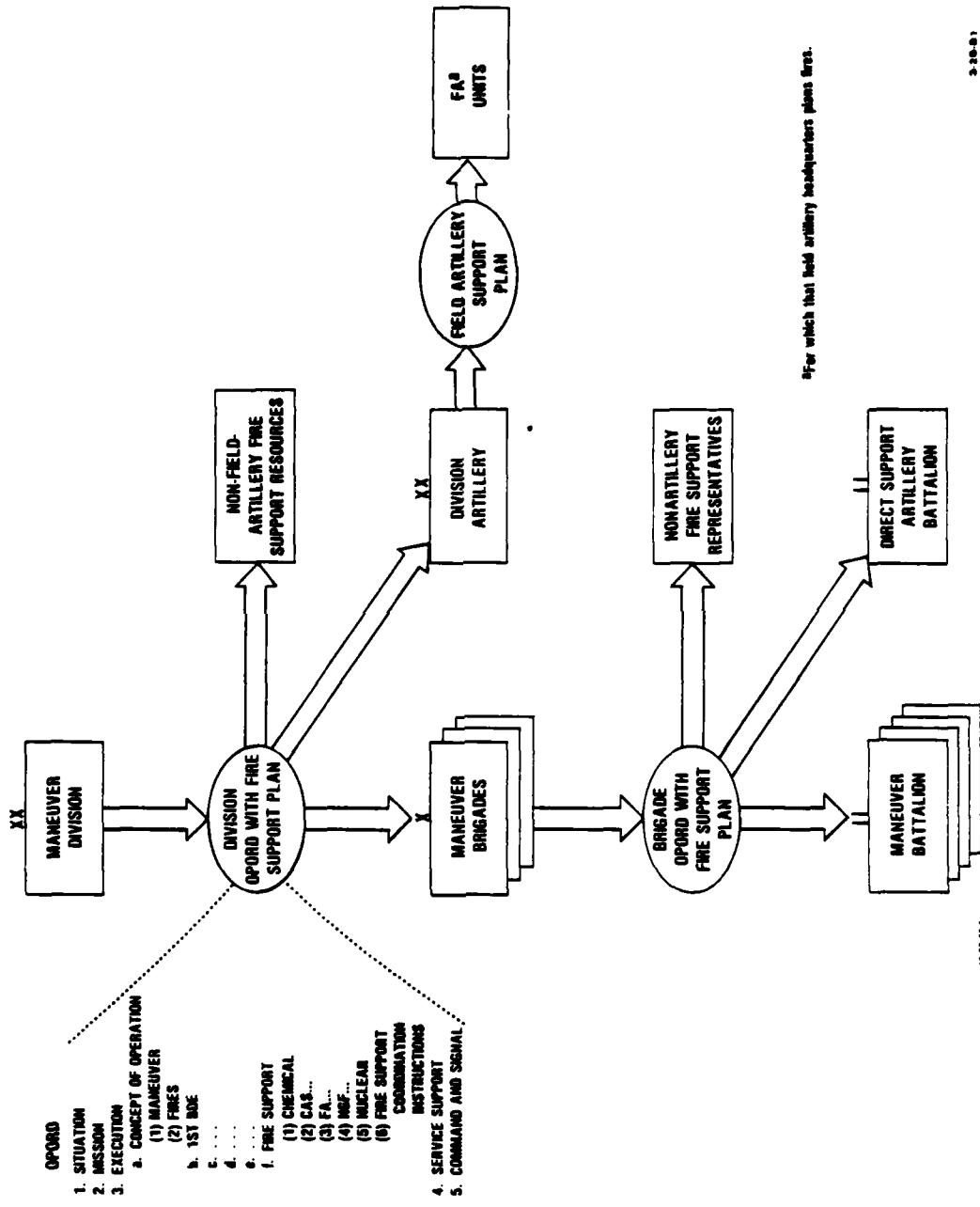
This figure shows the flow of formal fire support plans inside a division. The fire support plan for the division, included in the division's OPORD, includes sections for each type of fire needed to support the operation. DIVARTY uses the information in the OPORD as the basis for developing the field artillery support plan (a separate document). The division OPORD is also transmitted to the brigades where it is used to prepare individual brigade OPORDs, which also contain fire support sections. The schematic form of the division OPORD is shown in the figure. A sample OPORD appears in Appendix A.

In general, these formal fire support plans contain information about the targets associated with scheduled fires. Real-time targeting to meet the more immediate needs of the lower echelon maneuver units is done by informal planning.

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FORMAL PLANNING—OPERATIONS ORDER (OPORD)



#For which that field artillery headquarters plans fires.

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The field artillery (FA) support plan is prepared by the FA operations officer (S-3) based on the guidance and instructions in the OPORD. Target lists are received from the planning sources and compiled in a worksheet. The targets are plotted on an overlay, and duplications are resolved. The targets are analyzed to determine the method of attack and the units to fire. A schedule is prepared showing the targets that are to be fired on at specific times. Finally, the written plan is published and distributed.

This figure shows the major subdivisions of the FA support plan. A sample plan is shown in Appendix B.

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FORMAL PLANNING – FIELD ARTILLERY SUPPORT PLAN

- 1. SITUATION**
 - a. ENEMY FORCES
 - b. FRIENDLY FORCES
- 2. MISSION**
- 3. EXECUTION**
 - a. PRIORITY OF FA FIRES
 - b. ORGANIZATION FOR COMBAT
 - c. TARGET ACQUISITION
 - d. METEOROLOGY
 - e. SPECIAL INSTRUCTIONS
 - f. COUNTERFIRE MATRIX CODE
 - g. TARGETS (May be in annex)
 - h. SCHEDULES (May be in annex)

TARGET LISTS INCLUDE:
TARGET NUMBER
TARGET DESCRIPTION
TARGET LOCATION

SCHEDULES INCLUDE:
UNIT TO FIRE
TARGET NUMBER
NUMBER OF ROUNDS
TIME TO FIRE

- 4. SERVICE SUPPORT**
 - 5. COMMAND AND SIGNAL**
- ANNEXES**

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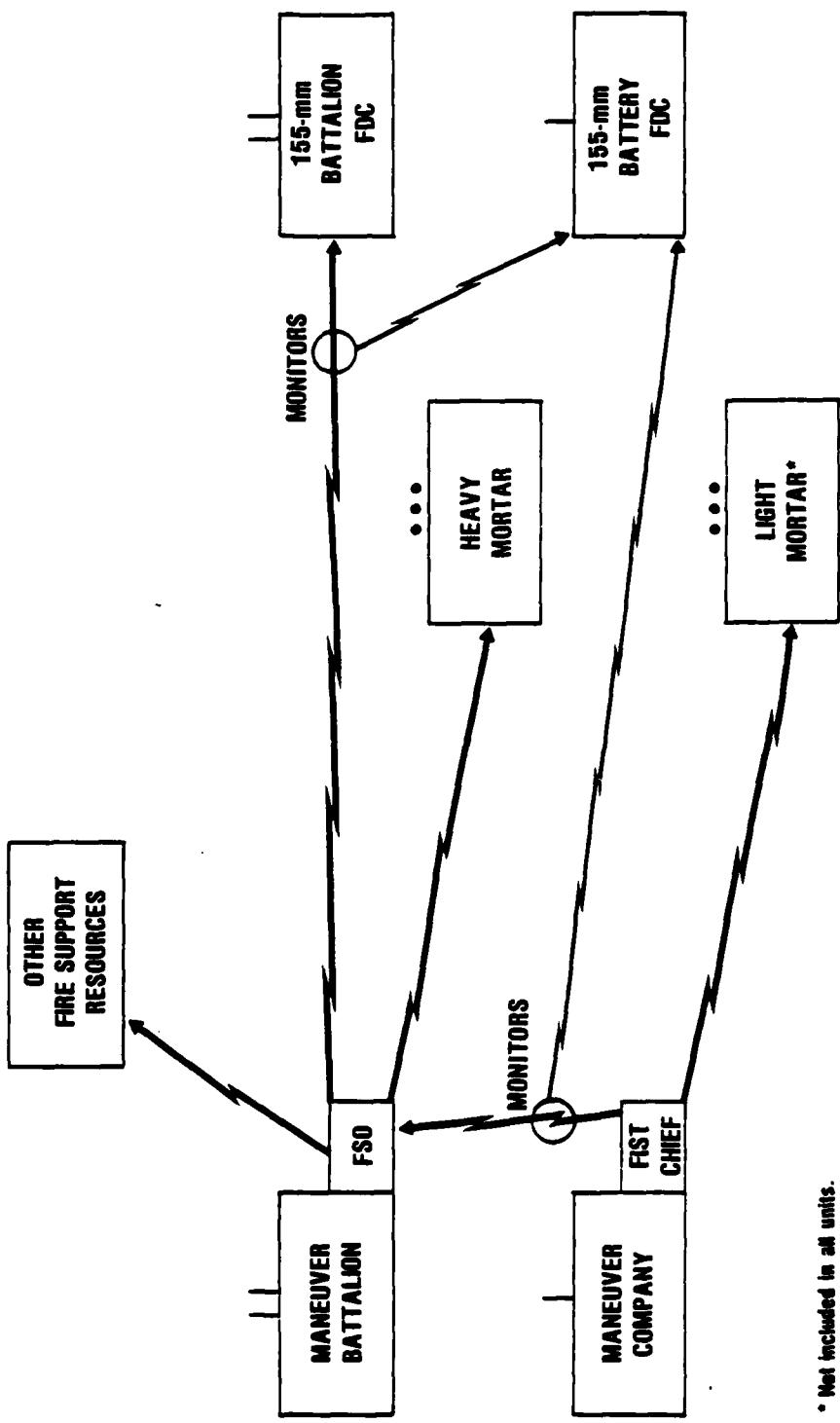
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Informal planning is normally conducted at the maneuver company and maneuver battalion levels. The FIST chiefs select targets based on the tactical situation, the terrain, and the maneuver commander's guidance. After receiving the company commander's approval, the FIST chief transmits the target list to the maneuver battalion FSO. The FSO resolves conflicts, consolidates targets from all his fire support teams, adds targets as required, and forwards the targets to the appropriate fire support units as shown. For field artillery, the battalion FSO transmits his target list to the artillery battalion fire direction center (FDC).

Communications in a manual artillery system are structured so that the battery firing missions for the battalion monitors this transmission and records the targets. Specific battalion- and company-generated fire support missions that are beyond the capability of the readily available fire support assets are forwarded to the brigade FSEs for attack by other fire support resources.

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INFORMAL FIRE PLANNING



* Not included in all units.
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The US Army defines fire support coordination as the real-time supervision of fire support assets. The principles of fire support coordination are shown on the next page. This type of coordination, generally done at all echelons, is described in the following pages for battalion and company levels. The two kinds of fire support coordination measures are geographic lines and areas, and they are established at maneuver brigade and above. (See pages 44 through 47.)

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PRINCIPLES OF FIRE SUPPORT COORDINATION

- ENSURE A CONTINUOUS FLOW OF TARGETING INFORMATION
- CONSIDER ALL AVAILABLE FIRE SUPPORT RESOURCES
- USE THE LOWEST ECHELON CAPABLE OF PROVIDING ADEQUATE SUPPORT
- USE THE MOST EFFECTIVE RESOURCES
- FURNISH, IF POSSIBLE, THE TYPE OF SUPPORT REQUESTED
- AVOID UNNECESSARY DUPLICATION OF FIRE
- CONSIDER AIRSPACE COORDINATION
- PROVIDE RAPID COORDINATION
- SAFEGUARD FRIENDLY FORCES

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Fire support coordination at the maneuver battalion level is of particular interest because that is the lowest echelon where air (and possibly naval gunfire) liaison officers (LOs) are physically present. The figure shows the battalion FSE surrounded by the entities with which it deals. These fall into three categories: FDCs to which the FSO has direct access, fire support systems to which the FSO has access through LOs, and other FSEs.

The FSO at the maneuver battalion may receive requests for fire from the FIST chiefs under his supervision, or he may generate requests for fire support through his own planning. When he selects heavy mortars, he assigns the fire mission to the mortar platoon FDC and he ensures that the FDC and FO are on the same radio net.

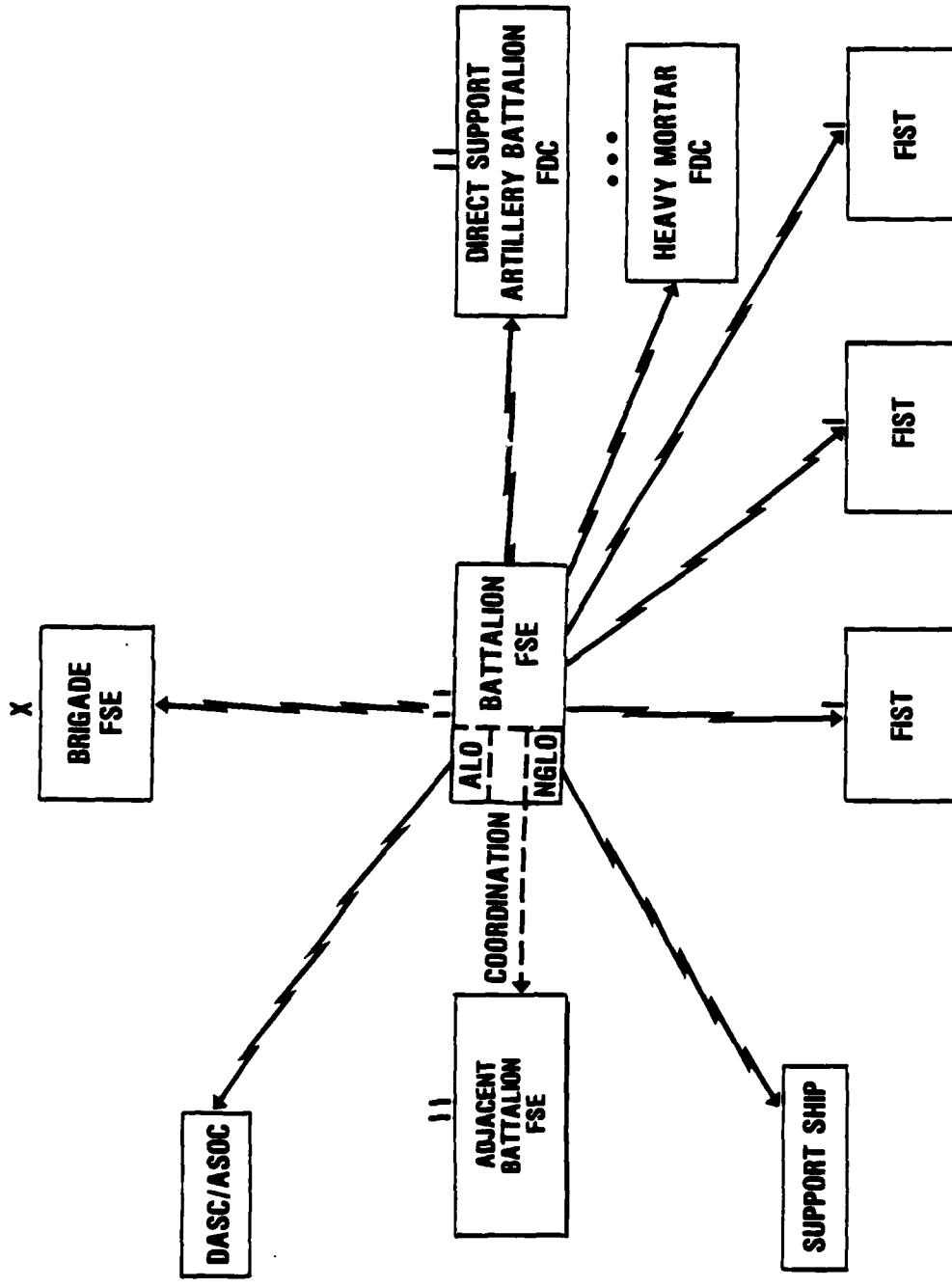
When naval gunfire or close air support (CAS) is selected to attack a target, the FSO forwards the request to the appropriate LO. Requests for immediate CAS are passed directly from the air LO to the direct air support center/air support operations center (DASC/ASOC) at corps via the air request net. The brigade and division FSEs monitor the transmission and intervene only if they wish to disapprove or amend the request. If the request for CAS is not for immediate support, it is passed through Army maneuver channels to the G-3 at the corps level.

To attack a target outside the battalion boundaries, the FSO coordinates his request with the appropriate adjacent FSE, as indicated by a dashed line to an adjacent FSE in the figure.

Requests for additional artillery fire from FIST chiefs are normally processed entirely by the field artillery FDCs rather than by the battalion FSO.

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UNCLASSIFIED **BATTALION LEVEL COORDINATION**



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Fire support coordination at the brigade is very similar to that at the battalion level. The brigade has access to the same kinds of resources as the battalion. The principal difference is that the brigade is allocated more assets and has a larger area of responsibility. All targets generated by the brigade FSE for the field artillery are transmitted to the DS battalion FDC. Requests for fire, other than from field artillery, are passed to the LOS within the brigade FSE or to the FSE at the division tactical command post.

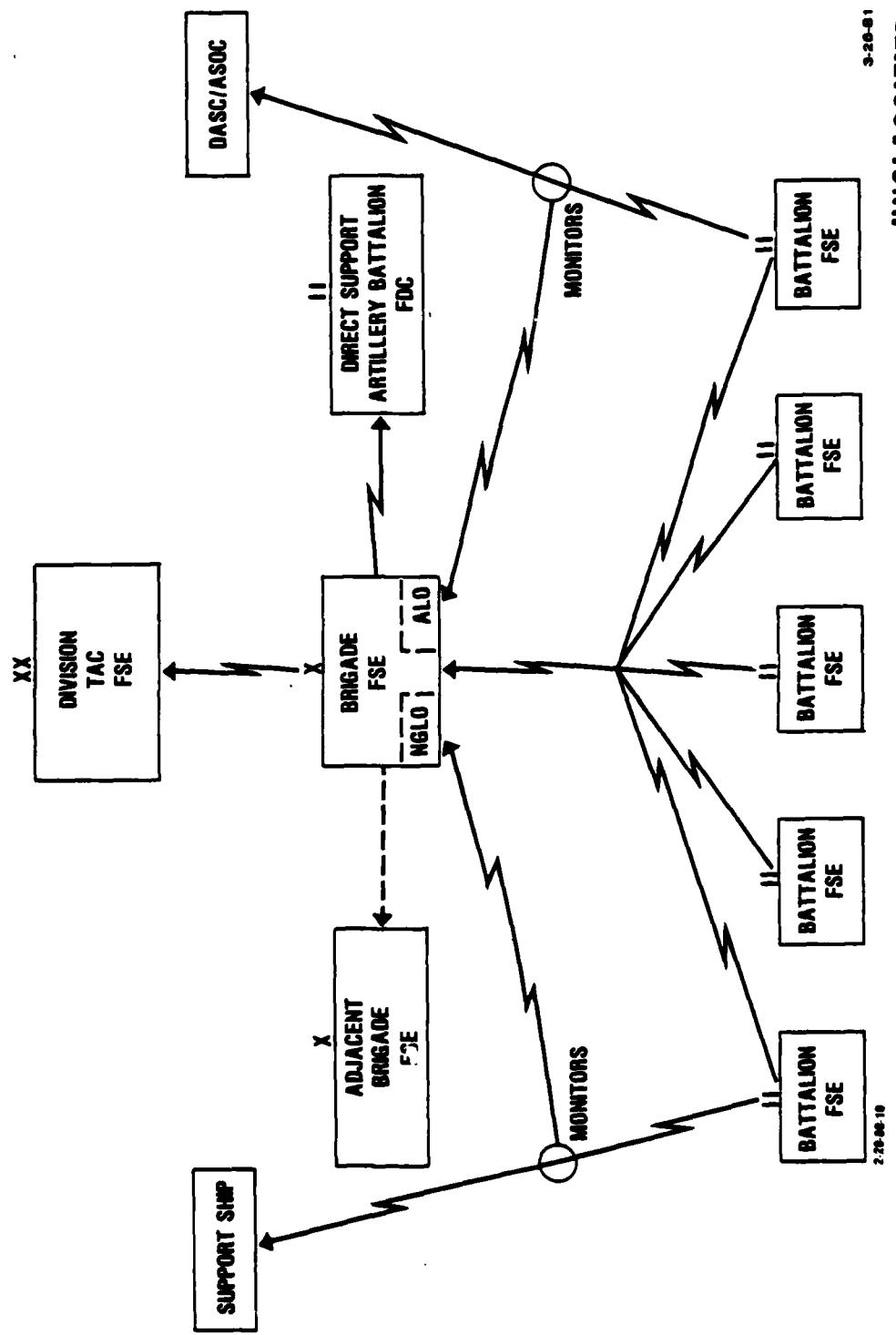
At the division level, fire support coordination is the responsibility of the FSE at the tactical command post. The division FSE performs the same kinds of functions as the brigade FSE but has access to greater allocations of resources. The only conventional fire support coordination function that the FSE performs at the division main headquarters is to relay requests for additional support from the FSE at the tactical command post to the corps.

Fire support coordination at the corps level primarily involves allocation or re-allocation of resources.

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BRIGADE LEVEL COORDINATION



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At the company level, the FIST chief is the FS COORD. Before battle, he determines which call for fire procedure listed on the accompanying chart is best for the observers in his team. His decision is based on the degree of control he wishes to retain, the amount of traffic expected on the radio nets, and, of course, the maneuver commander's guidance.

The FIST chief and the battalion FSE monitor all calls from the forward observer to the direct support battalion FDC, the direct support battery FDC, the maneuver battalion, and company mortars. The FIST chief and the battalion FSE maintain control either by approval through silence or disapproval by active intervention.

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FIRE SUPPORT COORDINATION
COMPANY LEVEL

AT THE DIRECTION OF THE FIRST CHIEF, THE FO:

- MAY HAVE PREAUTHORIZATION TO INITIATE A CALL FOR FIRE FROM ANY AVAILABLE MORTAR OR FA UNIT
- MAY INITIATE A CALL FOR FIRE DIRECTLY TO A SPECIFIED FIRE SUPPORT RESOURCE
- MUST CLEAR EACH REQUEST THROUGH THE FIRST CHIEF

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Fire support coordination measures define the degree of coordination required before fire support weapons may fire into the designated areas. Such measures ensure that fire will not jeopardize troop safety, interfere with other fire support systems, or disrupt adjacent unit operations. In addition to unit boundaries, which establish the basic operational zone, there are two classes of coordination measures—permissive and restrictive. Permissive measures are drawn in black on map overlays and are titled to indicate the establishing headquarters and the effective time. They indicate regions where rounds may be fired without further coordination.

The measures, listed in the figure, are defined as follows:

Coordinated Fire Line (CFL): A line beyond which conventional surface fire support means (mortars, field artillery, and naval gunfire ships) may fire at any time, within the zone of the establishing headquarters, without additional coordination. Its purpose is to expedite attack of targets beyond the CFL. It is located as close to friendly forces as the supported commanding officer desires.

Fire Support Coordination Line (FSCL): A line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground, or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line must be coordinated with the appropriate terrain features. The establishment of the fire support coordination line should follow well with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the fire support coordination line, without prior coordination with the ground force commander, provided the attack will not produce adverse surface effects on, or to the rear of, the line. Attacks against surface targets behind this line must be coordinated with the appropriate ground force commander.

Free Fire Area (FFA): A specifically designated area into which any weapon system may fire without additional coordination with the establishing headquarters. This measure is established to expedite fires and to provide an area to jettison CAS munitions if aircraft are unable to attack their intended targets. FFAs are usually established on identifiable terrain, but may be designated by grid coordinates if necessary.

¹NATO Glossary of Terms and Definitions for Military Use (English and French) (AAP-6).

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FIRE SUPPORT COORDINATION MEASURES—PERMISSIVE

<u>MEASURE</u>	<u>ESTABLISHED BY</u>
COORDINATED FIRE LINE (CFL)	BRIGADE OR DIVISION (POSSIBLY BATTALION) ECHelon
FIRE SUPPORT COORDINATION LINE (FSCL)	CORPS OR INDEPENDENT DIVISION
FREE FIRE AREA (FFA)	THE COMMANDER, USUALLY OF A DIVISION OR HIGHER ECHelon; IN COORDINATION WITH HOST NATION

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This figure summarizes restrictive fire support coordination measures. They designate areas into which weapons may not be fired without special coordination with the establishing headquarters. They also define the effective time interval, the time during which the measure is in effect.

The measures are:

Restrictive Fire Area (RFA): An area in which specific restrictions are imposed and into which fires that exceed those restrictions may not be delivered without coordination with the establishing headquarters.

No Fire Area (NFA): An area in which no fires or the effects of fires are allowed. Two exceptions are (1) when the establishing headquarters approves fires (temporarily) within a NFA on a mission basis, and (2) when an enemy force within the NFA engages a friendly force, in which case the commander may engage the enemy to defend his force. This measure may be designated on identifiable terrain by a grid or by a radius from the center point.

Restrictive Fire Line (RFL): A line established between converging friendly forces that prohibits fires or effects from fires across that line without coordination with the affected force. This measure is established to prevent interference between converging friendly forces. It is established on identifiable terrain and is usually closer to the force that is stationary.

Airspace Coordination Area (ACA): A block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may be defined in a written order. More frequently, however, it will be transmitted verbally (e.g., "Keep the FA and NGF north of green river, CAS to the south."). The ACA is established above the target as recommended by the air L0. The size is dictated by the type of aircraft and ordinance.

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FIRE SUPPORT COORDINATION MEASURES-RESTRICTIVE

<u>MEASURE</u>	<u>ESTABLISHED BY</u>
RESTRICTIVE FIRE AREA (RFA)	BATTALION OR HIGHER ECHELON; OR AN INDEPENDENTLY OPERATING COMPANY
NO FIRE AREA (NFA)	DIVISION OR CORPS ECHELON; IN COORDINATION WITH HOST NATION
RESTRICTIVE FIRE LINE (RFL)	THE COMMON COMMANDER OF THE CONVERGING FORCES
AIRSPACE COORDINATION AREA (ACA) ^a	BRIGADE OR HIGHER ECHELON COMMANDER

^a INFORMATION INCLUDES MINIMUM AND MAXIMUM ALTITUDE, LENGTH AND WIDTH,
AND EFFECTIVE DATE/TIME GROUP

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A fire mission is executed in response to a specific event. For example, the FO may visually acquire a target; division sensors may indicate the buildup of enemy forces in a specific area, and operations personnel may decide to attack; the target acquisition battery (TAB) radars may pick up incoming projectiles; or the time may come to fire the missions called out in the field artillery support plan. In the last case, the artillery needs no additional orders to carry out the mission. In all other cases, a call for fire is issued by the appropriate observer or TAB. Some typical events in the process are shown in this figure and are discussed in those following, including requests for counterfire or for support from a forward observer (FO) or a division tactical operations center (TOC).

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EXECUTION OF FIRE MISSIONS

IN RESPONSE TO:

- CALLS FROM FIST, FSO, OR TAB
- SCHEDULE OF FIRE IN FIELD ARTILLERY SUPPORT PLAN

TYPICAL EVENTS:

- ESTABLISH AUTHORIZATION
- TRANSMIT CALL FOR FIRE
- CONDUCT TACTICAL FIRE DIRECTION
- ISSUE FIRE ORDER
- CONDUCT TECHNICAL FIRE DIRECTION
- ISSUE FIRE COMMAND
- ADJUST FIRE
- FIRE FOR EFFECT
- TRANSMIT END OF MISSION

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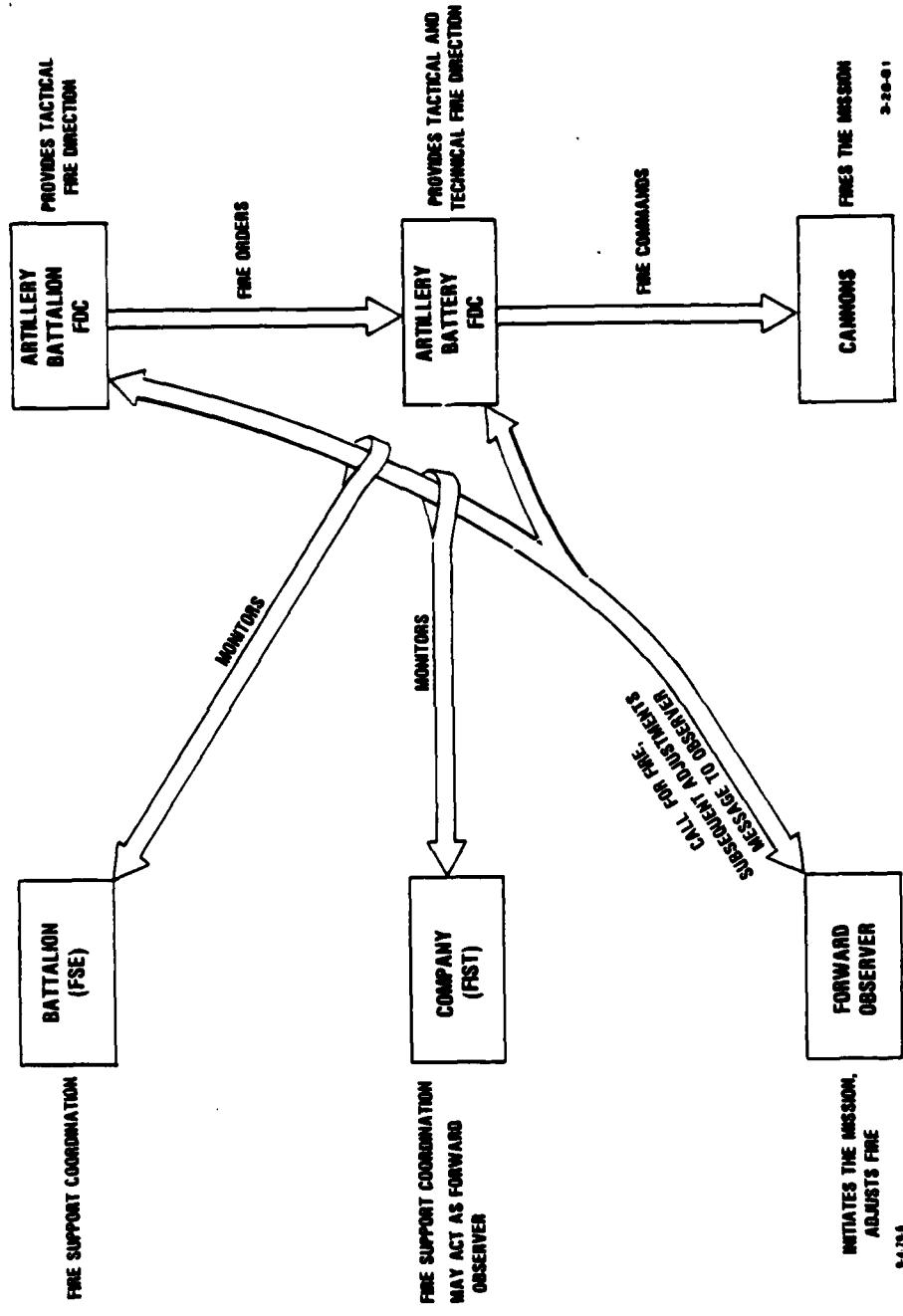
This figure shows the units that normally participate in a call for fire from an F0. As noted earlier, the FIST chief may or may not have his F0s request headquarters authorization before issuing a call for fire to the artillery battery or battalion (depending on the degree of control he wishes to maintain). Calls for fire are monitored by the FIST chief and the battalion FSE. If these entities do not intervene, the battalion FDC provides the tactical fire direction, which includes determining which units fire, the projectile type, and the number of rounds to be fired. The battalion FDC sends this information to the battery as a fire order. The battery provides technical fire direction, which includes computing the ballistic correction for the center of the cannon array. These data, with appropriate projectile information and instructions, are transmitted to the cannons through a fire command.

If an F0 is observing the target, he may request adjustments of the fire, based on its effectiveness. Alternatively, if the battery or battalion designated to support the call for fire can not carry out the mission, it may issue a request for additional fire to either its higher headquarters or, if it is being reinforced, to the reinforcing unit.

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PARTICIPANTS IN A CALL FOR FIELD ARTILLERY FIRE FROM THE FORWARD OBSERVER



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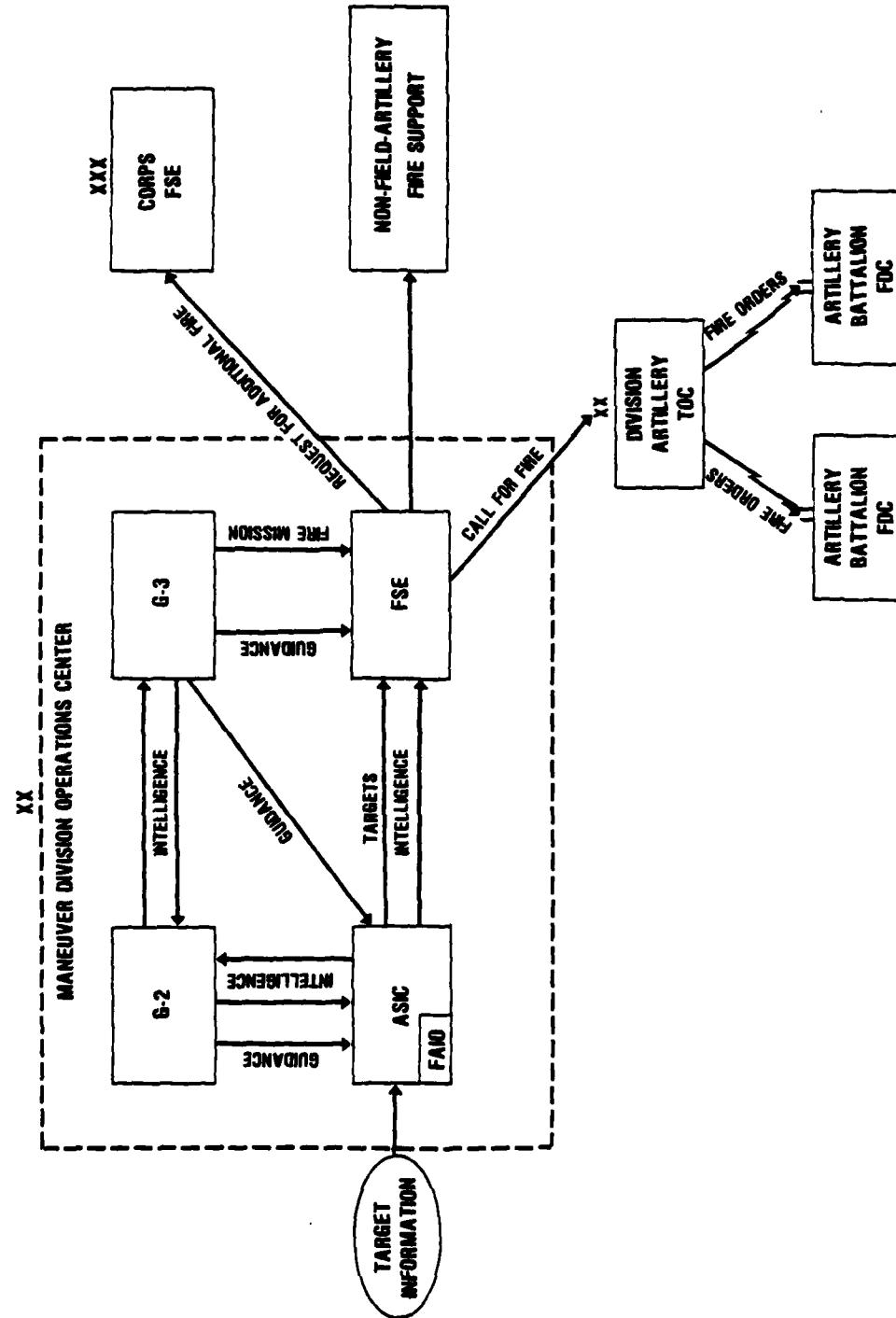
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This figure illustrates a call for fire that originates in the division command post (CP). Division targets may require massing of all or a large part of the artillery available at the division. In this example, the Field Artillery Intelligence Officer (FAIO), serving as an expediter in the All Sources Intelligence Center (ASIC), locates potential targets according to the guidance provided by the 6-3. He passes these targets to the FSE. The AFSCOORD, at the FSE, is responsible for coordinating all fire support resources at the division level. If the AFSCOORD decides to attack the target with field artillery, he sends a call for fire to the DIVARTY TOC, which performs tactical fire control and issues fire orders to its subordinate battalions. These battalions perform technical fire direction and issue appropriate fire commands to the batteries, which pass the commands to the tube artillery. The fire power of the organic, attached, and reinforcing units of the division may be insufficient to engage the target adequately, or they may be engaged in higher priority missions. In such cases, the division FSE may employ alternative fire support resources or may request additional field artillery support from the corps FSE through the division main FSE.

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DIVISION LEVEL CALL FOR FIRE



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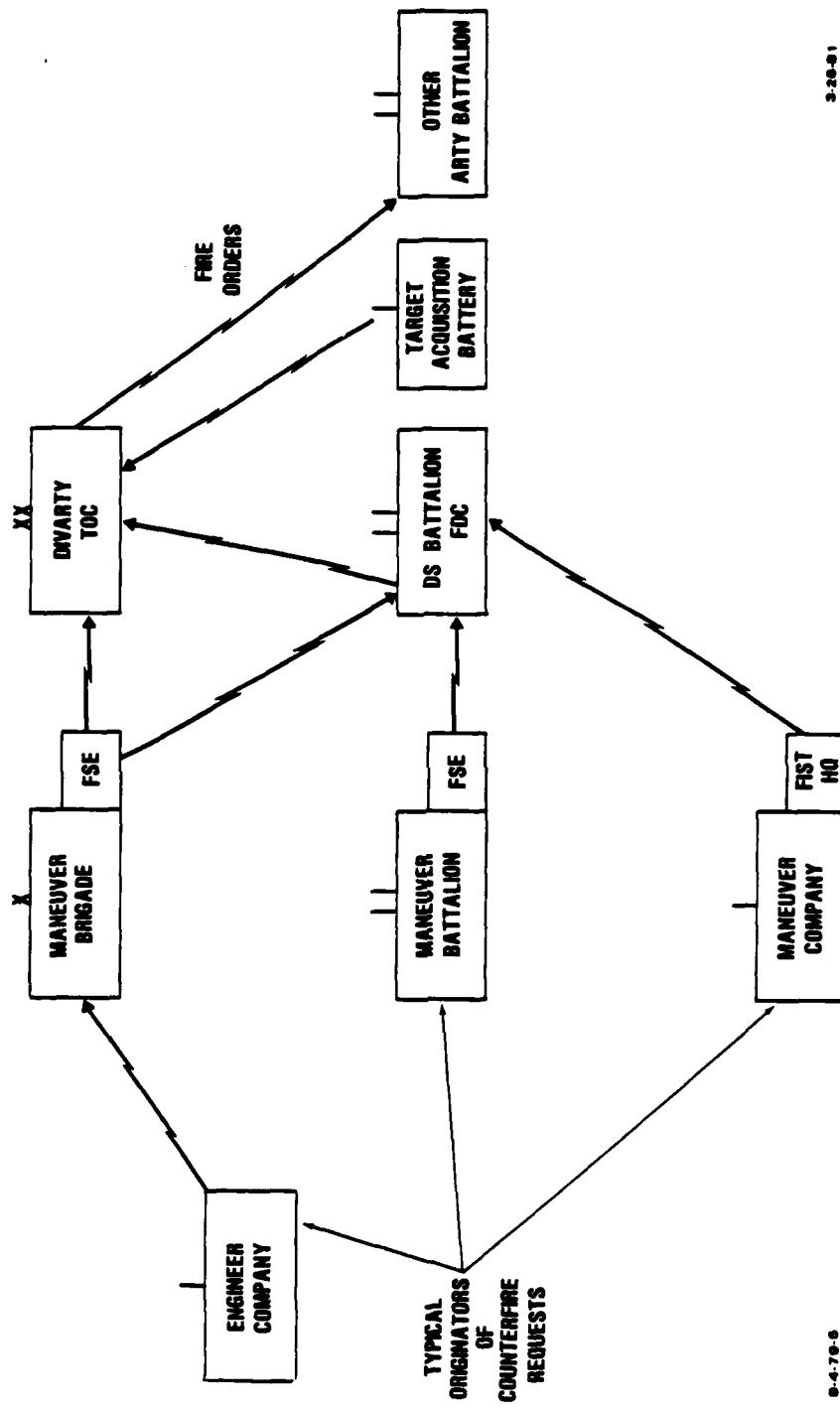
Counterfire may be needed across the entire division front. In addition, target acquisition for counterfire may depend on radars in the TAB. For these reasons, counterfire is the responsibility of the DIVARTY TOC. It may initiate counterfire in response to a request or undertake planned counterfire programs to suppress or destroy the enemy's artillery at a critical time and place.

Any unit receiving incoming artillery, mortar, or rocket fire may request immediate counterfire from the field artillery. Maneuver and artillery units request counterfire through fire support or fire direction channels. Other units request fire from the most available artillery FSE or the next senior maneuver headquarters; both pass the requests through the fire support or fire direction channels to the appropriate artillery unit where they are processed and passed to subordinate battalions for firing. The figure shows some examples of counterfire request channels.

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COUNTERFIRE REQUEST CHANNELS



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SECTION V

**OPERATIONAL FUNCTIONS
PERFORMED IN EACH ARTILLERY ORGANIZATION**

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This section discusses the operational functions of the various artillery organizations. When a particular type of artillery organization is located in more than one echelon, the functions performed in each are described (e.g., the FSEs at corps, division, brigade, and battalion). These functions are summarized in the organizational summary chart in the pocket at the rear of the briefing book.

The accompanying chart shows the location of the various artillery organizations with respect to their maneuver units. There is an FSE, or the equivalent, at each of the major echelons, as well as TOCs and FDCs located remotely from the maneuver units. Roughly speaking, fire support planning occurs at the FSEs associated with the maneuver units, and field artillery implementation occurs in the artillery units remote from the maneuver units.

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LOCATION OF ARTILLERY ORGANIZATIONS

Organization	Physically Located At Maneuver Units HQ	Artillery Units Independently Located
Fire Support Element (FSE)	X	
Fire Support Team (FIST)	X	
Forward Observers (FO)		X
Operations/Intelligence Element (O/I)	X	
Tactical Operations Center (TOC)		X
Fire Direction Center (FDC)		X
Corps		
Division	X	
Brigade	X	
Battalion	X	
Company	X	
Platoon Mech/Inf Division		X
Corps FA Brigade		X
DIVARTY		
Battalion (Cannon, Lance)		
ARTILLERY (Cannon, Lance)		
(Cannon, Lance)		

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This figure summarizes the functions of the operations/intelligence (O/I) element. The O/I element of the corps field artillery section (FAS) plans, coordinates, and executes field artillery support for the corps using the field artillery assets that are retained under corps control.

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FUNCTIONS OF THE FAS OPERATIONS/INTELLIGENCE ELEMENT

- UTILIZES ARTILLERY SURVEY
 - RECOMMENDS AMMUNITION REQUIRED SUPPLY RATE
- COORDINATES SEAD
- PERFORMS TACTICAL FIRE CONTROL
- PERFORMS NONNUCLEAR FIRE PLANNING
- PERFORMS PRELIMINARY CONVENTIONAL TARGET ANALYSES
- MONITORS STATUS OF CORPS FIELD ARTILLERY ASSETS
 - ASSISTS CORPS FSE IN THE FIRE PLANNING
 - ANALYZES ARTILLERY TARGET INTELLIGENCE
 - MONITORS BATTLEFIELD GEOMETRY
 - COORDINATES MOVEMENT OF FIELD ARTILLERY UNITS
 - PREPARES FA SUPPORT PLANS AND RECORDS
- RECOMMENDS SURVEY AND METEOROLOGICAL OPERATIONS IN THE CORPS ZONE
- METEOROLOGICAL DATA STORAGE AND EXCHANGE
- PROCESSES/AUTHENTICATES EMERGENCY ACTION MESSAGE (EAM)
- INITIATES CALL FOR FIRE
- INITIATES REQUEST FOR ADDITIONAL FIRE
- UPDATES TARGET FILE
- NOTIFIES UNITS TO CARRY PNL
- RECEIVES PERSHING ALLOCATION/STATUS FROM ARMY GROUP

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This figure summarizes the functions performed by the FSEs. As shown, elements at the higher echelons are normally more concerned with planning and resource allocation. At lower echelons, FSEs are involved in meeting the immediate fire support needs of the maneuver units. Note that, at the corps and division echelons, the FSEs recommend the distribution of field artillery, men, and materiel to the lower echelons. In addition, the FSO at each FSE recommends to his maneuver commander an allocation of the total firepower assets retained at his echelon.

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UNCLASSIFIED**FUNCTIONS OF THE FIRE SUPPORT ELEMENT**

FUNCTION			
ECHELON			
CORPS	DIVISION	BRIGADE	BATTALION
• RECEIVES AND DISSEMINATES CORPS COMMANDER'S GUIDANCE	x		
• IDENTIFIES, MOBILIZES, AND REFINES PREPLANNED PACKAGES CORRESPONDING TO TACTICAL SITUATION	x		
• REQUESTS RELEASE OF PACKAGE	x		
• RECOMMENDS APPORTIONMENT OF WEAPONS	x	x	
• PREDICTS FALLOUT (WMC ELEMENT-MAIN HQ)	x	x	x ^a
• PREPARES NUCLEAR AND CHEMICAL FIRE PLANS	x	x	x
• ANALYZES TARGET INTELLIGENCE	x	x	x
• PREPARES STRIKEWARNING	x	x	x
• PREPARES SCHEDULE OF NUCLEAR FIRE	x	x	x
• PERFORMS POSTSTRIKE ANALYSIS	x	x	x
• ALLOCATES AIR RESOURCE	x	x	x
• RECOMMENDS PNL DISTRIBUTION	x	x	x ^a
• PERFORMS NUCLEAR AND CHEMICAL TARGET ANALYSES	x	x	x
• PREPARES FORMAL, CONVENTIONAL FIRE PLAN	x	x	x
• INITIATES CALL FOR FIRE	x	x	x
• RECOMMENDS ALLOCATION OF FIRE SUPPORT RESOURCES	x	x	x
• RECOMMENDS AND MAINTAINS FIRE SUPPORT COORDINATION MEASURES	x	x	x ^b
• COORDINATES FIRE SUPPORT	x	x	x
• MAINTAINS CURRENT STATUS OF ALL FIRE SUPPORT RESOURCES	x	x	x
• PLANS AND COORDINATES SEAD	x	x	x
• PERFORMS NUCLEAR TARGET ANALYSES	x	x	x
• PERFORMS NUCLEAR TACTICAL FIRE CONTROL	x	x	x
• PERFORMS NUCLEAR NOMINATION/PACKAGE RETINEMENT	x	x	x
• COORDINATES WITH ADJACENT DIVISION TO RESOLVE PRE-INITIATION PROBLEMS	x	x	x
• COMPUTES EFFECTIVE DOWNWIND MESSAGE	x	x	x
• PERFORMS CHEMICAL FIRE PLANNING	x	x	x
• REFINES PACKAGE	x	x	x
• PERFORMS INFORMAL FIRE PLANNING	x	x	x
• SUPERVISES FIRE SUPPORT TEAMS	x	x	x
• MONITORS ALL CALLS FOR FIRE FROM SUBORDINATE FIRTS	x	x	x

^aPerformed at division main.

^bBattalion deals with selected measures.

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This figure summarizes the duties of the FIST chief and his subordinate FOs. The FIST chief coordinates all fire support at the company level, including field artillery, mortars, naval gunfire, and, in emergencies, CAS. He also plans fire support for the company and reports information on friendly and enemy forces. Enemy information is reported immediately to the artillery battalion FDC and then to the maneuver battalion FSO as soon as possible. Of course, the primary duties of the FIST chief are to locate and attack targets. In mechanized companies, he is assisted by three teams of FOs who travel with the maneuver platoons. These observers increase the area coverage of the FIST team and provide more responsive fire support.

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DUTIES OF THE FIST CHIEF AND FORWARD OBSERVERS

FIST CHIEF

- PERFORMS INFORMAL PLANNING
 - COORDINATES FIRE SUPPORT AT MANEUVER COMPANY LEVEL
 - REPORTS BATTLEFIELD INFORMATION
 - ACTS AS A FORWARD OBSERVER
 - INITIATES CALL FOR FIRE
 - PROVIDES EMERGENCY CONTROL OF CLOSE AIR SUPPORT
 - MAINTAINS COMMUNICATION WITH FORWARD OBSERVER AND SUPPORTING BATTERY FDCs
 - ADJUSTS MORTAR, FIELD ARTILLERY, AND NAVAL GUNFIRE
 - PREPARES END OF MISSION REPORTS
 - SUBMITS TARGET REPORTS
 - REPORTS LOCATION OF SELF AND FORWARD OBSERVERS
-
- FORWARD OBSERVER
- MAINTAINS COMMUNICATION WITH MANEUVER FORCES AND FIST CHIEF
 - INITIATES CALL FOR FIRE
 - OBSERVES AND ADJUSTS FIRE
 - PROVIDES END OF MISSION REPORTS
 - ACQUIRES TARGETS AND GENERATES TARGET REPORTS
 - KEEPS FIST AND FDC INFORMED OF HIS POSITION
 - REPORTS NBC DATA

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The DIVARTY TOC is the field artillery headquarters that supports a division. As discussed earlier, the counterfire role is usually the responsibility of the DIVARTY TOC. In addition, the DIVARTY TOC provides information to the division FSE for fire planning and target analysis and is responsible for monitoring the status of subordinate artillery battalions. The DIVARTY TOC also receives requests for additional fire from battalions that are unable to provide sufficient fire support to maneuver forces. The DIVARTY TOC will decide whether to task general-support artillery battalions to augment artillery fire or to request the division FSE for other fire support resources such as tactical aircraft (TACAIR).

This figure summarizes the functions performed in the DIVARTY TOC. Division-level fire missions require the DIVARTY TOC to perform tactical fire control, issue fire orders, and pass calls for fire to appropriate subordinate units.

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FUNCTIONS OF THE DIVARTY TOC

- COORDINATES COUNTERFIRE
- RECEIVES AND DISSEMINATES DIVISION COMMANDER'S GUIDANCE
- PERFORMS TACTICAL FIRE CONTROL
- SUPERVISES TARGET ACQUISITION ASSETS
- REVIEWS PRESCRIBED NUCLEAR LOAD AND LOCATION OF DIVISION UNITS
- DISTRIBUTES METEOROLOGICAL DATA TO BATTALION
- MONITORS STATUS OF DIVISION FIELD ARTILLERY ASSETS
- PREPARES DIVISION FIELD ARTILLERY PLAN
- ASSISTS DIVISION FSE IN FIRE PLANNING
- CONDUCTS DIVISION LEVEL FIRE MISSIONS
- PROCESSES/AUTHENTICATES EMERGENCY ACTION MESSAGE (EAM)
- INITIATES CALL FOR FIRE
- INITIATES REQUEST FOR ADDITIONAL FIRE
- UPDATES TARGET FILE
- MAINTAINS BATTLEFIELD GEOMETRY
- ANALYZES ARTILLERY TARGET INTELLIGENCE
- PERFORMS MUTUAL SUPPORT WITH OTHER DIVISION TACFIRES
- PERFORMS PRELIMINARY TARGET ANALYSIS
- COMPUTES ARTILLERY SURVEY DATA

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This figure summarizes the tasks performed by the fire direction organizations. Fire direction is the process of translating calls for fire into actions that fulfill the requests. It is conventionally divided into two parts—tactical and technical. Tactical fire control is the process of selecting targets, designating firing units, and allocating ammunition for each mission. It is communicated in a fire order. Technical fire direction is the process of solving the ballistic equation to determine the appropriate gun-pointing angles. This information is combined with the fire order, and both are issued to the guns in a fire command. Appendix D presents a more complete discussion of this process.

Both artillery batteries and battalions can receive requests for fire missions and convert them into firing data for the guns. The fire direction officer (FDO) has authority to approve fire mission requests and is responsible for the operation of the FDC. The FDCs maintain target lists; assist the FSC00RDs at company, battalion, and brigade echelons to decide the best means of attack; and prepare fire schedules.

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TASKS PERFORMED BY FIRE DIRECTION ORGANIZATIONS

BATTALION

- UTILIZES ARTILLERY SURVEY
- PERFORMS TACTICAL FIRE CONTROL
- PERFORMS TECHNICAL FIRE CONTROL WHEN REQUIRED
- DISTRIBUTES METEOROLOGICAL DATA TO BATTERIES
- MONITORS BATTALION FIRE UNIT AND AMMUNITION STATUS
- ASSISTS SUPPORTED BRIGADE IN FIRE PLANNING
- REPORTS STATUS OF SUPPORTED BRIGADE OPERATIONS
- MAINTAINS TARGET LIST
- MAINTAINS BATTLEFIELD GEOMETRY
- PROVIDES MUTUAL SUPPORT WITH OTHER BATTALION TACFIRES
- MAINTAINS COMMUNICATIONS WITH SUPPORTED ARTILLERY UNITS
- PROVIDES FIRE SUPPORT PERSONNEL TO SUPPORTED MANEUVER UNITS
- EXCHANGES FIRE SUPPORT COORDINATION MEASURES
- EXCHANGES TARGET INFORMATION
- REPORTS FIRE UNIT STATUS AS REQUESTED
- REPORTS AMMUNITION STATUS AS REQUESTED
- REPORTS NBC DATA
- PROCESSES/AUTHENTICATES EAM
- DISTRIBUTES PNL
- REFINES SUBPACKAGE
- CONTROLS MOVEMENT AND DEPLOYMENT OF BATTERIES
- INITIATES CALL FOR FIRE
- INITIATES REQUEST FOR ADDITIONAL FIRE

BATTERY

- UTILIZES SURVEY DATA
- MAINTAINS SITUATION MAP
- PERFORMS TECHNICAL FIRE DIRECTION
- MONITORS UNIT AND AMMUNITION STATUS
- MONITORS STATUS OF BATTLE
- MAINTAINS TARGET LIST
- REPORTS NBC DATA
- PROCESSES/AUTHENTICATES EAM

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This figure describes the functions of the field artillery brigade and the target acquisition battery (TAB).

The field artillery brigade is tailored by the corps commander for a specific mission and may have a variable number of FA battalions attached. The FA brigade normally does not have any maneuver counterpart; thus, its commander does not have the responsibility of serving on a special staff, nor does he provide fire support personnel to maneuver units. The specific functions of the brigade are listed on the next page. It should be noted that when an FA brigade is attached to a division, the brigade is able to function as an alternate DIVARTY TOC or to assume the responsibilities of support to a maneuver brigade in a portion of the division zone. The brigade can act in any field artillery mission. If the brigade, under corps control, has a GSR or standard reinforcing mission, a divisional direct support battalion must go through both DIVARTY headquarters and the FA brigade headquarters to get fire from one of the FA brigade's battalions.

The TAB is the main source of target acquisition data at the division level. It produces counterfire targets almost exclusively, employing weapon locating radars, moving target locating radars, sound ranging bases, and flash ranging observation posts. These units generally operate successfully at a range of 15-20 km in front of the FEBA. The TAB has the ability to integrate the positions of targets derived from the various sensors and to produce multisensor target analysis.

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FUNCTIONS OF THE FIELD ARTILLERY BRIGADE AND THE TAB

FIELD ARTILLERY BRIGADE TOC (CORPS ASSETS):

- MAINTAINS BATTLEFIELD GEOMETRY
- ASSISTS DIVISION FSE IN FIRE PLANNING
- MONITORS STATUS OF DIVISION ARTILLERY ASSETS
- COORDINATES COUNTERFIRE WITH DIVISION ARTILLERY
- DISTRIBUTES METEOROLOGICAL DATA TO BATTALIONS
- PERFORMS TACTICAL FIRE CONTROL
- PROCESSES/AUTHENTICATES EAM
- REFINES SUBPACKAGE
- CONDUCTS FIRE PLANNING
- CONDUCTS DIVISION LEVEL FIRE MISSIONS

TARGET ACQUISITION BATTERY:

- PERFORMS MULTISENSOR TARGET ANALYSIS AND LOCATION
- ACQUIRES COUNTERFIRE AND OTHER TARGETS
- VERIFIES THE LOCATION OF NUCLEAR BURSTS FIRED BY FRIENDLY FORCES
- ASSISTS IN CALIBRATION OF FIELD ARTILLERY WEAPONS
- REPORTS NBC DATA
- ASSISTS IN REGISTRATION OF WEAPONS
- INITIATES CALL FOR FIRE

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SECTION VI

**INFORMATION EXCHANGED BETWEEN
ARTILLERY ORGANIZATIONS**

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Five general categories of information (shown on the next page) are transferred between artillery units. Each general information category has a number of specific categories that refer to particular messages used to transfer the information or parts of the information. The data elements associated with each of the specific categories and the messages that may be used to transfer them are shown in Appendix C.

For many of the categories shown, the precise content of the messages will depend on which units send and receive them. For example, the category Fire Unit Status normally includes all pertinent facts about the unit, including its location. If, however, the message addressee already knows the fire unit's location, and it has not changed, the message may be abbreviated to include only a specific detail, such as the loss of a weapon from hostile fire or equipment malfunction.

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INFORMATION CATEGORIES

PLANNING/TARGETS/INTELLIGENCE

COMMANDER'S GUIDANCE
 FIRE PLANS
 TARGET PRIORITIES
 FIRE SUPPORT COORDINATION
 MEASURES
 RESOURCE ALLOCATIONS
 TARGET LISTS
 TARGET NUMBER (I.D.)
 ARTILLERY TARGET INTELLIGENCE
 (ENEMY)
 SITUATION INTELLIGENCE REPORT
 (FRIENDLY)
 TARGET (DROVE ACQUIRED)
 SCHEDULED FIRES
 PLANNED TARGETS
 TARGET LOCATIONS
 POST-STRIKE INTELLIGENCE
 AIR SUPPORT ALLOCATIONS
 TARGET FILE SEARCH CRITERIA
 SCHEDULING CRITERIA
 FIRE PLANNING DATA
 STATUS
 COMBAT SUPPORT LOCATION
 (AMMUNITION)
 FORCE ARTILLERY WITHIN
 MANEUVER ZONE
 READINESS MESSAGE
 FIRE UNIT (LOCATION, DATA)
 AMMUNITION
 MANEUVER UNIT (FRONTLINE
 TRACE, BOUNDARIES)
 OBSERVER LOCATION
 ARTILLERY FORCE
 FIST AND FORWARD OBSERVER
 LOCATIONS
 FIRING PLATOON LOCATION

FIRE DIRECTION PROCEDURES INCLUDING ORDERS, REQUESTS, AND REPORTS

TARGET REPORTS
 FIRE MISSIONS
 FIRE ORDERS
 PRIORITY OF FIRE SUPPORT
 FIRE ADJUSTMENTS
 APPROVAL, DISAPPROVAL OF FIRE MISSIONS
 MESSAGE TO OBSERVER
 QUEING DIRECTIVES (FROM DIVARTY TOC)
 REQUEST TO OBSERVE REGISTRATION CALL FOR FIRE (REQUEST)/COPY OF ASSIGNMENTS OF FIRE DIRECTION NET
 REQUEST FOR ADDITIONAL FIRE
 DAMAGE REPORTS
 ARTILLERY TARGET INTELLIGENCE REPORTS
 MOVEMENT/DISPLACEMENT ORDERS
 REQUEST FOR MOVEMENT
 END OF MISSION REPORT
 QUEING REQUEST (FROM BN TOC)
 PREPLANNED AIR SUPPORT REQUESTS
 REGISTRATION DATA
 BATTLEFIELD GEOMETRY
 LOCATION OF FIRING POINTS
 FIRE MISSION COMMAND (SHOT)
 MET & OTHER TECH DATA
 SURVEY DATA
 BALLISTIC DATA
 METEOROLOGICAL DATA
 COMMUNICATIONS DATA

NBC-1, -2, -3, -4, -5
 TARGET LISTS
 WEAPON STATUS
 NUCLEAR FIRE PLANS
 LOCATION OF FRIENDLY BURSTS
 FIRE ORDER INSTRUCTIONS
 REQUESTS FOR ADDITIONAL FIRE
 FIRE ORDERS
 TARGET RECOMMENDATIONS
 STRIKE WARNING
 FALLOUT DATA
 SCHEDULED NUCLEAR FIRES
 REQUEST FOR RELEASE OF PACKAGE
 RELEASE OF PACKAGE
 ALERT MESSAGE
 RELEASE OF SUBPACKAGE
 PNL REDISTRIBUTION
 PACKAGES TO BE REFINED
 UNITS TO FIRE NUCLEAR MISSION
 NUCLEAR FIRE MISSIONS
 MISSION STATUS
 MISSION FIRED REPORT
 SUBPACKAGES TO BE REFINED
 POTENTIAL TARGETS
 "READINESS" MESSAGE
 NUCLEAR DEVELOPMENT FILES A, B
 MESSAGES
 EFFECTIVE DOWNLINK MESSAGE
 DAMAGE AVOIDANCE INFORMATION
 TARGET NOMINATION
 NUCLEAR WEAPON ALLOCATION
 PERSHING ALLOCATION STATUS
 RELATIVE TIME RESTRICTION
 PACKAGE MODIFICATION
 LAUNCH SITE DATA
 PACKAGE APPROVED FOR PLANNING PURPOSES

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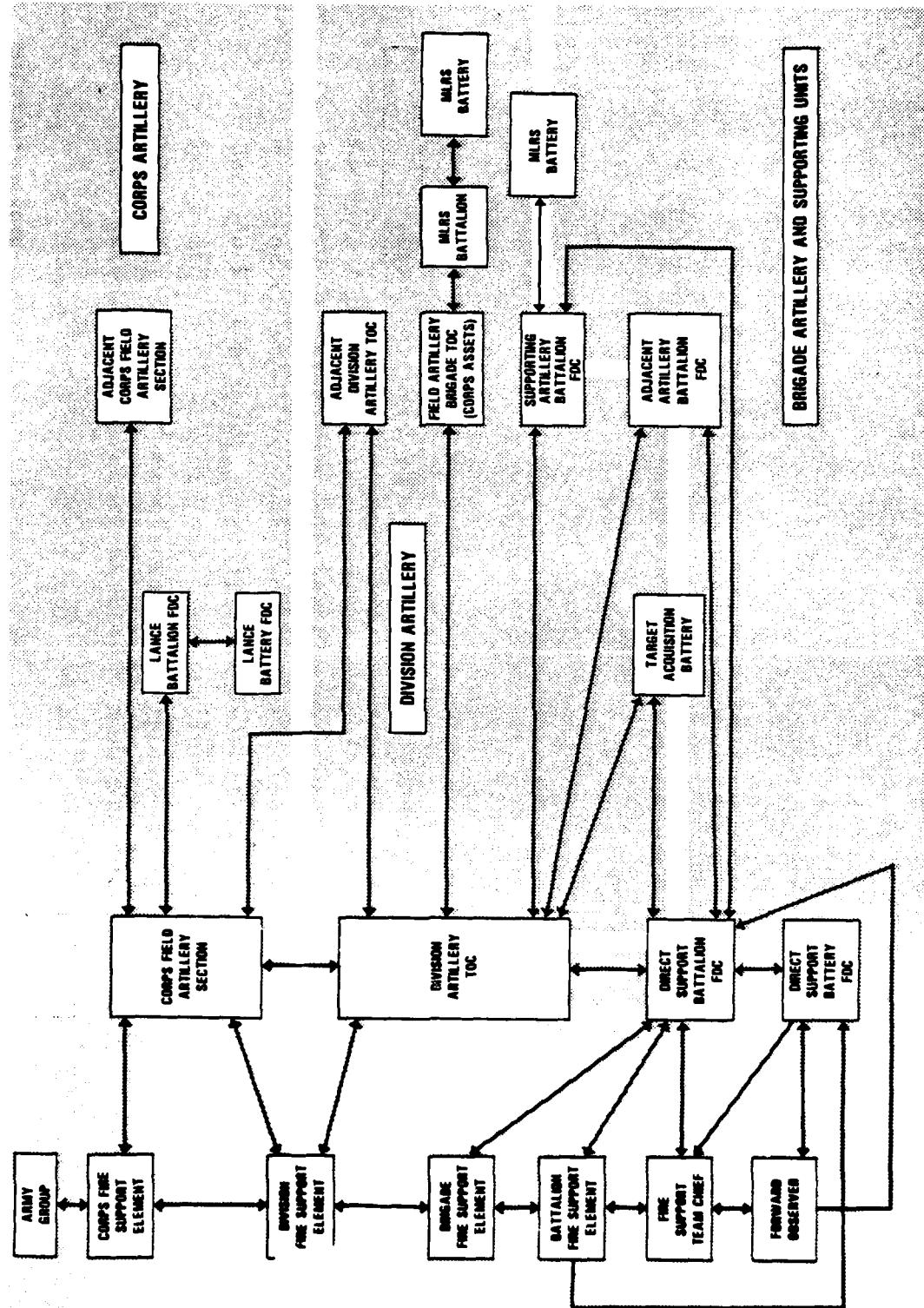
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In the following pages, the summary chart is arbitrarily partitioned to facilitate discussion of the information flow among artillery units. The composite shown on the following page shows the corps, division, and brigade artillery and supporting units as major sections, with smaller units shown on the borders. The border units illustrate areas of shared responsibility between two major entities. The division fire support element is shown at the border between corps and division artillery, since that element contains functions that support both corps and division. Similarly, the division artillery TOC, the direct support battalion FDC, the target acquisition battery, and the adjacent and supporting artillery battalion FDCs are shown on the border between division and brigade because they have functions shared by those two major segments.

These partitions are arbitrarily assigned and are not intended to have a direct relationship to the interfaces previously described.

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INFORMATION FLOW FOR U.S. ARTILLERY



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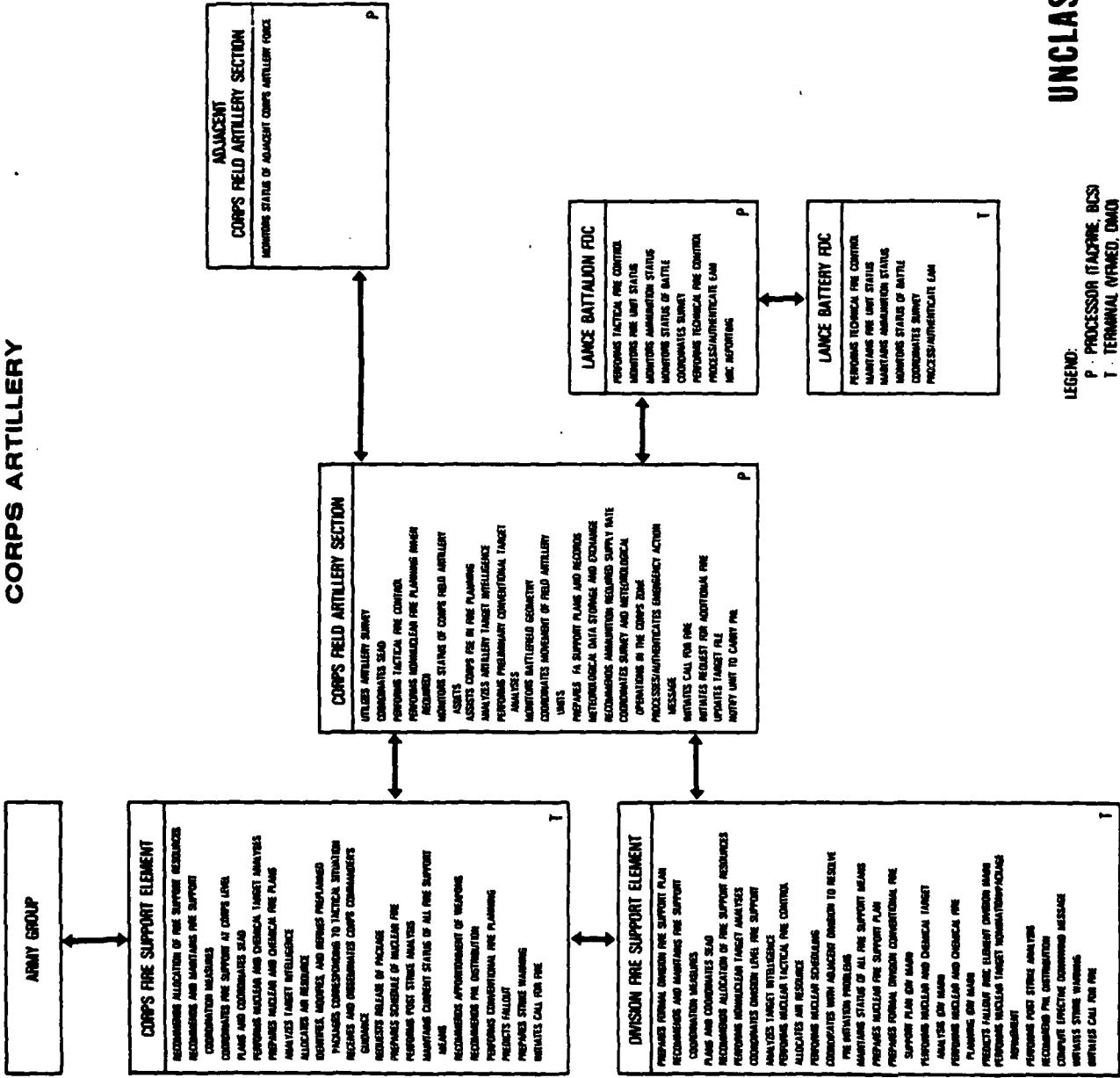
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Primarily, the corps artillery delivers nuclear ordnance with the LANCE missile. As described in Section V, Operational Functions Performed In Each Artillery Organization, the corps field artillery section will probably have its weapon brigades attached to the division or ready to reinforce the division artilleries. The corps FAS will normally retain LANCE and may retain some brigades to respond to the changing needs of the divisions.

Refer to chart in back pocket for flow of information between units.

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CORPS ARTILLERY



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LEGEND:

- P - PROCESSOR (AFCPNE, BCS)
- T - TERMINAL (VME) (M6802)

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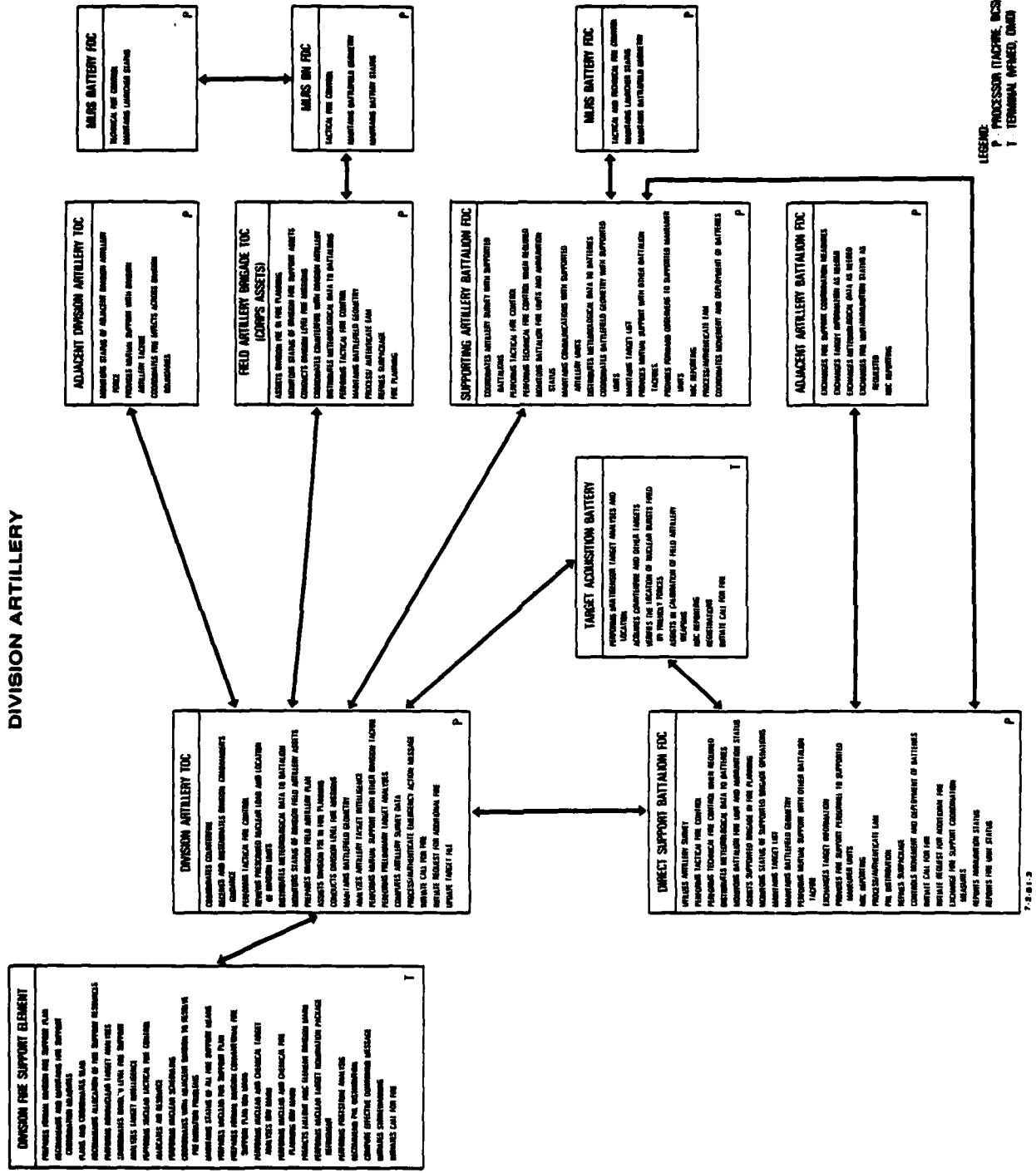
The division artillery delivers both conventional and nuclear ordnance. The center of all division artillery activity is the division artillery (DIVARTY) TOC. The DIVARTY TOC receives planning and guidance from the corps and implements it by assigning appropriate missions to the division artillery units. The TAB reports to the DIVARTY TOC, where the information is processed and disseminated to all division artillery units requiring the data.

Refer to chart in back pocket for flow of information between units.

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DIVISION ARTILLERY



LEGEND:

- P - PROCESSOR TRACE, BGS
- T - TERMINAL MESSAGE, QMGR

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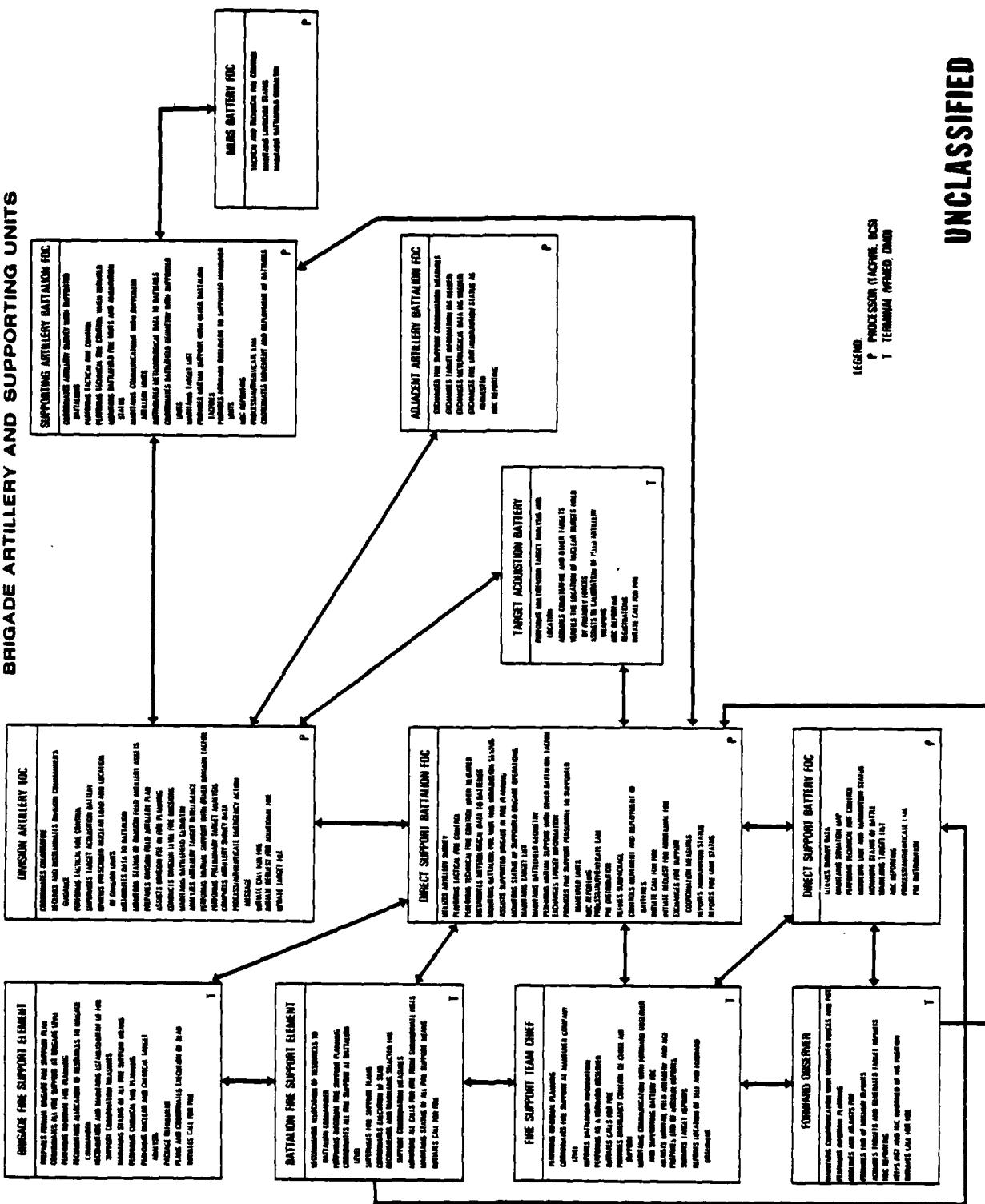
The brigade artillery and its supporting units help conduct the "current" war. The primary echelon is the maneuver battalion directly supported by a battalion of artillery. The brigade's interaction with the DIVARTY TOC, with the TAB, and with the supporting and adjacent battalion FDCs is shown in the figure.

Refer to chart in back pocket for flow of information between units.

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BRIGADE ARTILLERY AND SUPPORTING UNITS



LEGEND.
 ♦ PROCESSOR (ACQUISITION, RCS)
 1 TERMINAL ARMED, DATA

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SECTION VII

ADP SUPPORT — TACFIRE AND BATTERY COMPUTER SYSTEM (BCS)

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The Tactical Fire Direction (TACFIRE) System and the Battery Computer System (BCS) are designed to automate certain artillery functions, thereby freeing the fire direction and fire support personnel to concentrate on the best use of the available fire support. However, final approval of the automated products and control of the artillery operation remain with the personnel.

This section describes TACFIRE and BCS, concentrating on the functions supported by and the information flow between the major elements of the system.

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TACFIRE AND BATTERY COMPUTER SYSTEMS

- AUTOMATE ROUTINE FUNCTIONS
- ENABLE MORE CENTRALIZED CONTROL BY COMMANDER
- FACILITATE IMPROVED RESPONSIVENESS AND EFFECTIVENESS

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This figure shows the system interfaces within a representative TACFIRE- and BCS-equipped field artillery unit that supports a US corps; interfaces are either computer-to-computer links or remote-entry-device-to-computer links.

The corps and DIVARTY/field artillery brigade TACFIRES will have the same basic hardware, comprising a central processing unit, memory units, a communications control unit, a control console, line printers, a digital plotter map, and an electronic tactical display. The line printers make paper copies of TACFIRE messages and actions for retention. The digital plotter map displays the locations of both friendly and enemy units, fans of fire from batteries, fire support coordination measures, and targets. The electronic tactical display is used to display different force dispositions and to study proposed plans. Corps and DIVARTY/field artillery brigade TACFIRES will be housed in two S-280 shelters, each mounted on a 5-ton truck. The corps and DIVARTY/field artillery brigade TACFIRES will differ little in software, although the corps will have more capacity for fire planning.

The battalion TACFIRE has the same basic hardware as division TACFIRE, with less memory and without the electronic tactical display. Battalion TACFIRES are tailored for firing battery control and interaction with reinforcing artillery. Battalion TACFIRE is housed in a single S-280 shelter, mounted on a 5-ton truck.

The BCS has a battery computer unit (BCU) that is either mounted in a M577 or M561 vehicle or dismounted. It is designed for technical fire control of a battery. Each gun will be equipped with a gun display unit (GDU), which will display firing commands automatically sent from BCU.

The Variable Format Message Entry Device (VFMED) is a remote entry device consisting of a keyboard and display, with a printer for hard copy. It allows the user to enter and receive necessary data from the computer and has secure two-way communication with TACFIRE. The VFMED is a transportable device usually mounted on a vehicle, but it can be dismounted when necessary.

The Digital Message Device (DMD) is a handheld electroluminescent message entry and display device that will prompt the user to enter the necessary data in a message. The DMD can interface directly with the ground/vehicular laser locator designator (GVLID) by hardware.

The new TPQ-36 and TPQ-37 countermortar/counterbattery radars (not shown) and the remotely piloted vehicle (RPV) (not shown) will also be directly linked to TACFIRE at division and battalion. The radars and the RPV automatically generate requests for fire and are part of the TAB.

Crypto equipment is provided for all links between TACFIRE/BCS elements except those with the DMD.

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